

ROUTING AND RECORD SHEET

SUBJECT: (Optional) Occupational Safety and Health Inspection Report -
Office of Technical Service

FROM:

Director of Security
4E60 Hqs

EXTENSION

NO.

OS 1 1102/1

DATE

28 JUL 1981

TO: (Officer designation, room number, and building)

DATE

RECEIVED

FORWARDED

OFFICER'S
INITIALS

COMMENTS (Number each comment to show from whom to whom. Draw a line across column after each comment.)

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EO/DDA
7D24 Hqs

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Per our agreement at meeting on 20 July 1981, attached is a copy of the Safety Inspection of OTS for forwarding to the DDCI.

The original is being forwarded to Director, Office of Technical Service.

Att

OS 1 1102/1

HEALTH AND SAFETY SURVEY

LOCATION: South, Central & East Buildings

DATE: June 15 - 26, 1981

INSPECTED

BY:

Safety Group

Physical, Technical & Area
Security

STAT

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e. Ground the receptacle at the left of the world map.

7. Room 3

a. Cover the power panel to the right of the refrigerator. There are exposed wires and a sign on the box dated August 1977, which warns that the box is hot and dangerous.

b. Replace the faceplate on the fifth receptacle to the right of the refrigerator.

c. Secure the receptacle box to the wall on the left side of the storage cabinet.

d. Reduce the impedance to 2 ohms or less in the receptacle under the panel box.

8. Room 7

Replace the faceplate on the switch.

9. Second Floor, GSA Closet

Install a cover on the junction box.

10. Room 227

Install a faceplate on the receptacle supplying power for the air conditioner.

11. Room 226A

a. Replace the plug on the fan. The plug is broken and has been taped.

b. Repair or replace the heating panel box controlling the air conditioners.

12. Room 225

Secure the receptacle box to the wall by the filing cabinet.

13. Room 224

Install permanent wiring to replace multiple receptacle adaptors.

14. Room 223

a. Install a faceplate on the receptacle supplying power to the air conditioner.

b. Provide a more traditional means of activating the fan switch than the necktie currently used.

15. Room 222

Repair or replace the fan cord.

16. Room 1D

Ground the lower left receptacle.

17. Room 5

Replace the switch faceplates, both on the wall and on the pegboard.

18. Second Floor, Vault

Install a cover on the junction box.

19. SA&E Equipment Room

Ground the power strip.

20. Room 221

a. Ground the power strip to the right of the door.

b. Replace the power strip with permanent wiring.

B. Central Building

1. Attic

Install covers on all of the numerous uncovered boxes.

2. Room 200

Reduce the impedance to 2 ohms or less and install a faceplate on the receptacle.

3. Room 217

Replace extension cords with permanent wiring.

4. Room 218A

Secure the receptacle outlet box to the wall.

5. Room 225

a. Repair or replace the spliced air conditioning cord. Flexible cord is to be used in one continuous length.

b. Replace the faceplate on the receptacle on the column to the rear of the room.

6. Room 227, Left Room

Repair or replace the refrigerator cord.

7. Room 215

Cap the wires and cover the junction box above the lowered ceiling.

8. GSA Store Room, Second Floor

Complete the power panel index.

9. Room 206

a. Correct the reversed polarity (hot, neutral reversal) in the receptacle at the door to wig storage.

b. Ground the receptacle in the NE corner of the makeup room.

c. Ground the receptacle in the SW corner of the disguise workshop.

d. Replace the faceplate under the first aid kit in the latex room.

10. Room 204

a. Reduce the impedance to 2 ohms or less in the receptacle left of the sink and in all three receptacles behind the camera and in the receptacle above the typewriter.

b. Correct the reversed polarity situation in the second receptacle to the left of the sink.

11. Room 201

Reduce the impedance to 2 ohms or less in both of the receptacles.

12. GSA Storeroom, First Floor

Index the breakers in the power panel by the flood light switch.

13. Hall outside of above Storeroom

Ground the receptacle by the water fountain.

14. Hall outside of Room 100

Install a cover on the junction box above the ceiling tiles.

15. Room 100

Replace extension cords with permanent wiring. Currently, a spliced extension cord is run through a partition to supply power at the secretary's desk. Flexible cord is to be used in one continuous length and extension cords are only to be used for temporary power for less than 90 days.

16. Room 104

a. Ground the receptacle below the hypo and fix tanks in the left dark room.

b. Replace the faceplate on the switch above the extinguisher by the copyboard for the Fast Camera.

c. Cap the wires and cover the junction box above the ceiling tiles in the Film Holder Room for the Fast Camera.

d. Repair or replace the box for the lower switch in the Vertical Camera Room. All electrical boxes are to be continuous, i.e., with all knock-out plugs in place.

17. Room 102, Printing

- a. Secure the receptacle box to the wall and replace the damaged receptacle to the right of the emergency exit.
- b. Repair or replace the cords for the lamps at the Penograph and Penograph Grinder and the cord to the belt grinder.

18. Room 107

- a. Reduce the impedance to 2 ohms or less in the receptacle in front of the "flat" files.
- b. Install permanent wiring to replace the extension cords and multiple receptacle adaptors.

19. Room 9

Secure the receptacle box to the wall at the right of the paper cutter.

20. Room 11

Install a cover over the open breaker space in the power panel.

21. Electrical Closet behind Guard's Area

Completely index the power panel.

22. Press Room

- a. Repair or replace the box for the switch to the left of the Heidelberg Offset on the south wall; the switch box on the west wall by the Heidelberg #3610-00-958-0732; on the west wall by the handfeed press; the switch for the Heidelberg Platen; and the switch in the lunch room on the east wall. Boxes should be completely enclosed, i.e., with no knock-out plugs missing.
- b. Correct the reversed polarity in the receptacle next to the Heidelberg Offset Press #651676 and in the back room by the refrigerator.
- c. Replace the cord to the clock above the type cast machine. Flexible cord is to be used in one continuous length and not spliced.

- d. Replace the frayed cord on the ultraviolet dryer.
- e. Replace or repair the conduit by the water fountain. Conduit should be continuous.

C. South Building

1. Room 148, Rear Room

Reduce the impedance to 2 ohms or less in the receptacle to the right of the air conditioner and in the power strip by the typewriter.

2. Room 148, Front Room

Reduce the impedance to 2 ohms or less in the receptacle behind the bookcase.

3. Room 152

a. Correct the reversed polarity (hot, neutral reversal) next to the enlarger in the darkroom.

b. Ground the receptacle by the dryer outside of the darkroom.

c. Reduce the impedance to 2 ohms or less in the receptacle to the right of the light box in the slide viewing area.

d. Ground the receptacle between the D&E area.

e. Reduce the impedance to 2 ohms or less in the receptacle to the left of the table in Room F.

f. Main Room

(1) Correct the reversed polarity in the receptacle by the Leitz Enlarger.

(2) Correct the intermittent ground in the receptacle by the slate table.

g. Reduce the impedance to 2 ohms or less in the receptacle to the right of the enlargers and in the receptacle to the left of the clock in Room G.

h. Reduce the impedance to 2 ohms or less in the receptacle to the right of the clock and in the receptacle to the left of the enlarger in Room H.

i. Reduce the impedance to 2 ohms or less in the receptacles on both sides of the enlarger and on both sides of the clock in Room I.

j. Reduce the impedance to 2 ohms or less in the receptacles on both sides of the clock and in the receptacle to the left of the enlarger in Room J.

4. Room 143

a. Replace the chipped faceplate on the east wall between the first two tables.

b. Reduce the impedance to 2 ohms or less in the receptacle in the center of the south wall.

c. Ground the receptacle in the southwest corner.

5. Room 136

Ground the receptacles on both sides of the southeast corner.

6. Room 137

a. Reduce the impedance to 2 ohms or less in the receptacle on the southeast side of the center column.

b. Ground the receptacle in the northwest corner.

c. Resecure the faceplate to the receptacle outlet in the center of the north wall.

d. Replace the faceplate on the receptacle outlet on the northeast wall.

7. Room of Chief, TB

Reduce the impedance to 2 ohms or less in the receptacle behind the desk.

8. Room 133

Reduce the impedance to 2 ohms or less in the receptacle

behind the secretary and in the receptacle to the left of the air conditioner.

9. Room 135

a. Replace the receptacle by the door leading to Room 133. The receptacle is broken.

b. Reduce the impedance to 2 ohms or less in the receptacle beside the safe.

10. Room 127

Ground the receptacle above the telephone table.

11. Room 125A

Reduce the impedance to 2 ohms or less in the receptacle under the clock.

12. Room 123

Ground the receptacle behind the secretary's desk in the corner.

13. Room 115

Reduce the impedance to 2 ohms or less in the receptacle to the left of the window.

14. Room 111B

Ground the receptacle supplying the coffee pot and refrigerator.

15. Room 111

a. Correct the reversed polarity in the receptacle to the right of the window behind the Deputy Chief's, Logistics, desk.

b. Ground the receptacle to the right of the desk on the same wall as the Deputy Chief's desk.

c. Chief's Office

Replace the faceplate to the left of the desk and beside the small bookcase.

16. Corridor, Outside 102 and 111 Suite Areas

Ground the receptacle above the fire alarm pull station.

17. Chief's Office, CMS

Replace the faceplate on the receptacle behind the safe, resecure the box and ground the receptacle.

18. Deputy Chief's Office, CMS

Ground the receptacle to the left of the window.

19. Security Officer's Office, CMS

Replace the faceplate beside the typewriter.

20. Negotiator's Office, CMS

Ground the receptacle to the left of the window and the receptacle to the right of the window.

21. Audit Office, CMS

Reduce the impedance to 2 ohms or less in the receptacle.

22. File Area, CMS

Replace the faceplate on the receptacle by the coffee pot.

23. Room 112

a. Ground the following receptacles: to the left of the door; under the rear clock; and both receptacles beside the air conditioner in the Deputy Chief's Office.

b. Replace all multiple receptacle adaptors with permanent wiring.

c. Reduce the impedance to 2 ohms or less in the following receptacles: to the right of the air conditioner; in the receptacle to the right of the desk in the disbursement area; and to the left of the air conditioner in the Chief's Office.

24. Room 144

Reduce the impedance to 2 ohms or less in the receptacle under the chalkboard and in the receptacle to the right of the typewriter.

25. GSA Closet, First Floor

a. Repair or replace the junction box above the door. The cover plate is missing and a knock-out plug is missing.

b. Install covers on both of the electrical panel boxes.

26. Chief, Personnel Branch Office

Ground the receptacle and replace the faceplate on the receptacle by the door.

27. Room 120

Reduce the impedance to 2 ohms or less in the receptacle to the left of the air conditioner and secure the faceplate.

28. Room 122

Replace the faceplate beside the desk.

29. Stairwell, Room 9, End of Corridor

Ground the stairwell receptacle.

30. Room 9

Correct the open neutral.

31. Room 29

Replace extension cords with permanent wiring.

32. Room 27

Repair the receptacle outlet box opening so that the faceplate will completely cover the opening.

33. Room 21

a. Correct the reversed polarity in the receptacle supplying the typewriter.

b. Replace the multiple receptacle adaptors with permanent wiring.

34. Room 45

a. Ground the power strip on the table in the southwest corner of the room and the strip on the table along the north wall.

b. Replace the faceplate on the 220 volt receptacle on the east wall by the exterior door.

c. Repair or replace the electrical cords at the project engineers's table.

35. Room 40

Reduce the impedance to 2 ohms or less in the power strip on the bench to the left of the sink.

36. Room 32

Replace extension cords and multiple receptacle adaptors with permanent wiring.

37. Room 30

Repair the opening for the receptacle outlet box so that it can be completely covered by the faceplate.

38. Stairwell between First and Second Floor, Room 218

Ground the receptacle.

39. Door by Stairwell

Ground the receptacle located with the switches.

40. Suite 203, Director's Conference Room

Replace the receptacle under the screen.

41. Door to 216 Mechanical Room

Ground the receptacle.

42. Suite 204

a. Replace the multiple receptacle adaptors with permanent wiring.

b. Replace chipped faceplates.

c. Ground the receptacle to the left of the air conditioner.

d. Reduce the impedance to 2 ohms or less in the receptacle at the electrostatic air cleaner.

43. Room 208

a. Ground the receptacle on the rear wall.

b. Repair or replace the air conditioner cord. Flexible cord is to be used in one continuous length.

44. Room 212

Install a cover for the open breaker space.

45. Hallway, Across from 218

Index the power panel.

46. Room 224

a. Ground the receptacle to the left of the air conditioner.

b. Repair or replace the receptacle to the right of the air conditioner.

47. Room 223

Correct the reversed polarity in the receptacle on the rear wall to the right of the air conditioner.

48. Room 227

Ground the receptacle to the right of the desk and secure the receptacle box to the wall.

49. Room 233

Secure the receptacle to the wall to the right of the air conditioner.

50. Room 226

a. Repair or replace the receptacle to the left of the air conditioner.

b. Ground the receptacle to the right of the air conditioner.

51. Room 230

Ground the receptacle to the right of the air conditioner.

52. Room 232

Ground the receptacles to the right of the marker board and to the right of the air conditioner.

53. Room 234

Reduce the impedance to 2 ohms or less in the receptacle to the right of the air conditioner.

54. Room 236

Reduce the impedance to 2 ohms or less in the receptacle to the right of the safe and replace the faceplate.

55. Room 235

a. Reduce the impedance to 2 ohms or less in the receptacle under the chalkboard.

b. Ground the receptacle to the right of the air conditioner.

56. Room 239

Reduce the impedance to 2 ohms or less in the receptacle under the chalkboard.

57. Hallway across from Room 238

Completely index the power panel.

58. Stairwell Door, Room 238, end

Reduce the impedance to 2 ohms or less in the receptacle to the left of the door.

59. Suite 254 Area, Corridor

Install a cover around the breakers in the panel box to the left of the files.

60. Room 254A

Reduce the impedance to 2 ohms or less in the receptacle in front of the safe and secure the box to the wall.

61. Room 244

Reduce the impedance to 2 ohms or less in the receptacle above the heat register in the left office and in the receptacle to the left of the bookcase in the rear office.

62. Room 240

Ground the receptacle to the right of the door and in the receptacle above the desk.

63. Room 255

Reduce the impedance to 2 ohms or less above the credenza in the Chief, Chemical Branch's Office, and in both receptacles under the air conditioner in the central office.

64. Room 251

Replace the faceplate on the receptacle to the left of the bookcase.

65. Room 247

Ground the receptacle to the left of the air conditioner.

66. Room 243A

- a. Correct the reversed polarity in the receptacle next to the filing cabinet.
- b. Ground the second receptacle from the filing cabinet.
- c. Repair or replace the cord to the emergency light.

67. Room 344

- a. Reinstall the cover on the air conditioner power panel in the rear office.
- b. Replace the faceplate and receptacle to the right of the air conditioner in the left front office.

68. Room 354

Install permanent wiring to replace the multiple receptacle adaptors and extension cords.

69. Room 353, Corridor

Replace the faceplate at the photocopier.

70. Room 343

Ground the receptacle to the left of the air conditioner.

71. Room 347

Ground the receptacle to the right of the air conditioner.

72. Room 341

Ground the following receptacles: right of the air conditioner in the rear office; in the four-way receptacle box in the center office; in the receptacle to the right of the air conditioner in the center office; in the receptacle by the filing cabinet on the rear wall of the center office; and in the receptacle in the right rear of the left office.

73. Room 338, Janitorial Area

Install a blank to cover the open breaker space in the power panel by the sink.

74. Room 336

Install a faceplate on the receptacle between the desk and bookcase on the right side of the room.

75. Room 334

Install a faceplate on the 220 volt receptacle at the air conditioner.

76. Room 328

Resecure the conduit to the wall left of the desk.

77. Room 339

Replace the faceplates to the 220 volt receptacle and to the 115 volt receptacle.

78. Room 335

Reduce the impedance to 2 ohms or less in the receptacle to the left of the air conditioner.

79. Room 329

Replace the faceplates on the receptacle in front of the safe and on the receptacle to the left of the two-drawer cabinet.

80. Room 327

Ground the receptacle to the right of the air conditioner.

81. Room 303

Reduce the impedance to 2 ohms or less in the receptacles on both sides of the air conditioner.

82. Conference Room

Repair or replace the junction box cover in the rear.

STAT

83. Equipment Branch, Right of Door to Room 309

Repair or replace the junction box cover in the rear office.

84. Room 309

a. Install permanent wiring to replace extension cords in the left office.

b. Ground the receptacle on both sides of the air conditioner in the center office and the receptacle to the left of the partition.

c. Replace the faceplate to the left of the air conditioner.

85. Fourth Floor Photo Labs

a. Ground the receptacle under the blackboard in the center room housing the refrigerators, and in the receptacle to the right of the refrigerators.

b. Index the 50 cycle power panel and install a blank in the open breaker space.

86. Fourth Floor, Electrical Shop

Cover the junction box in the ceiling.

87. Fourth Floor, Logistics Record Section

a. Install a faceplate on the receptacle behind the bookcase.

b. Install permanent wiring to replace the extension cords.

88. Cubicle between Room 4007 A&B

Install a faceplate on the receptacle.

89. Outside Room 4201

Install a faceplate on the receptacle by the water fountain.

90. Room 4201B

Install a cover plate on the light switch.

II

FIRE PROTECTION

A. East Building

1. Hallway outside of Room 124A

Install an identification sign for the water fire extinguisher.

2. Hallway across from Air Handling Unit and across from Room 6

Install an identification sign for the dry chemical extinguisher.

3. Room 7

Have the carbon dioxide extinguisher inspected. It was last inspected 3/28/79.

4. Female Lockers, GSA

Install an identification sign for the water extinguisher.

5. Second Floor Hall

Install an identification sign for the water extinguisher.

6. Room 5

Replace and/or inspect both of the carbon dioxide extinguishers which were last inspected in 1971.

B. Central Building

1. Attic

a. Remove soiled rags, waste paper products, and old parts from the air handling area.

b. Remove the plastic trash can of soiled rags located by the faucet and air compressor.

c. Remove wooden slats and box parts.

2. Room 225, Document Vault

Repair or replace the dangling rate-of-rise heat detector.

3. Room 206

a. Reduce the amount of packing material, (boxes, paper, etc.) stored against the air handling unit in the wrapping room.

b. Inspect or replace the dry chemical fire extinguisher in the disguise workshop. It was last inspected in 1977.

c. Keep the access path to the fire escape completely clear in the Mold Storage Room.

4. First Floor Ladies' Room

Repair or replace the rate-of-rise heat detector.

5. Room 104

Install a fire escape in the rear wall of the storage area and Copy Board Room for the 100 Camera.

6. Room 102, Printing

Maintain clear access to the fire exit.

7. Press Room

a. Mount the water fire extinguisher.

b. Obtain 3 carbon dioxide or dry chemical fire extinguishers to use on electrical or chemical fires.

c. Inspect or replace the dry chemical extinguisher located next to the two color presses. It was last inspected August 1979.

8. Room 16

Mount the BC fire extinguisher in a readily accessible location and install an identification sign.

C. South Building

1. Room 147

Move paper and books away from electrical receptacles. Combustible material, such as paper, should not be stored in direct contact with electrical receptacles.

2. Rooms 134, 131, 219, 127

Install a rate-of-rise heat detector and tie it to the existing system.

3. Corridor, Outside of 102 and 111 Suite Area

Maintain clear access to the fire alarm pull station. Currently, access is blocked by stored items.

4. Hallway across from Room 9

Install an identification sign for the water fire extinguisher.

5. GSA Mechanical Room

Maintain clear access to the BC fire extinguisher.

6. Hallway Outside of Photo Mechanical Branch Laboratory

Maintain clear egress route by keeping boxes, shelving, paper and extra equipment out of the hallway.

7. Room 15

Maintain clear access to the BC fire extinguisher and install identification signs for the BC and carbon dioxide fire extinguishers.

8. Room 45

Mount all of the fire extinguishers and install an identification sign for each extinguisher.

9. Rooms 44, 40, 39

Inspect or replace the BC fire extinguishers last inspected in 1979 and install identification signs.

10. Room 39

Provide clear access to all fire extinguishers.

11. Room 33

Install a water fire extinguisher.

12. Room 3

a. Repair or replace the rate-of-rise heat detector head.

b. Maintain a minimum of eighteen inches from the ceiling to allow for proper sprinkler action.

13. Rooms 242, 251

Install a water fire extinguisher in each area.

14. Rooms 343, 303

Inspect the BC fire extinguishers.

15. Fourth Floor Stairwells

Repair or replace the rate-of-rise heat detectors that have been painted.

16. Fourth Floor Electrical Shop

a. Mount and inspect the dry chemical fire extinguishers.

b. Install a second dry chemical extinguisher and install identification signs for both fire extinguishers.

17. Logistics Storerooms, Fourth Floor, Rooms 2 & 3

Repair and/or inspect all fire extinguishers.

18. Rooms 4201 and 4202

Replace and/or inspect all fire extinguishers.

III

CHEMICAL STORAGE AND HANDLING

A. Introduction

1. A contractor, under a contract with the Office of Technical Services, will be providing, under separate cover, the majority of the comments and recommendations regarding chemical storage and handling, including the volume and usage rates. They will also supply the majority of the ventilation measurements. This report will only mention the categories of concern expressed by the [] representatives and items that, for reasons of security or location, were not inspected by the [] team and were inspected by the Safety Group staff.

2. The categories of concern expressed by contractor are as follows:

- a. Computability of chemical storage.
- b. Storage and handling of known and suspect carcinogens.
- c. Disposal techniques.
- d. Personal protective programs.
- e. Quality of the special ventilation system, i.e., hood exhaust rate, purification of air prior to leaving the system, and back flow from hood to hood.

B. Central Building, not inspected []

1. Room 218

Dispose of the aqueous ammonia no longer needed for the microfilm processing.

2. Storeroom Next to Room 9

Provide separate storage for strong mineral acids and organic liquids.

3. Room 106

Prevent the storage of food in the same refrigerator with chemicals.

C. South Building, not inspected by contractor

1. Exit by Room 9

Secure the carbon dioxide cylinder and tag as to whether it is empty or not. Compressed gas cylinders should be secured to the wall with a chain or strap or to specially designed carts.

2. Room 58

During the planned renovation, a chemical storage area should be designed. The storage should be well ventilated and sprinkled. Separate storage areas should be provided that will allow compatible storage.

3. Room 39

Prevent the storage of food in the same refrigerator with chemicals.

4. Room 62

Secure the compressed gas cylinders to the wall with straps or chains or to carts specially designed for cylinder storage.

5. Room 4024

Secure the Freon 12 cylinder to the wall with a strap or chain or to carts specially designed for cylinder storage.

6. Room 4201A

- a. Identify the unlabeled liquid.
- b. Dispose of all chemicals no longer used.

IV

EMERGENCY LIGHTING

A. Central Building

1. Install emergency lights on the attic stairwell landing.
2. Room 104
Install an emergency light system.
3. Room 106
Repair or replace the emergency light.
4. Room 107
Mount the emergency light and keep it plugged in.
5. Press Room
Repair or replace the emergency lights.

B. South Building

1. Room 152, Main Room
Repair or replace the emergency light.
2. Stairwell, Room 9, End of Corridor
Install an emergency light.
3. Room 243A
Repair or replace the emergency light.
4. Third Floor Stairwell
Install emergency lights.
5. Fourth Floor Stairwell
Install emergency lights.
6. Room 4201, Central Room
Repair or replace the emergency light.

V

VENTILATION

A. Central Building

1. Press Room

The capture velocity for the Ludlow is 90 fpm at the working surface. This value is adequate to protect employees, since the crucible is also vented and the volume of work is relatively small. No air borne lead has been detected from air monitoring.

2. Etching Area

The capture velocity of the hood is 120 fpm and individual pieces of equipment have now been vented internally. The American Conference of Governmental Industrial Hygienists recommends a capture velocity of 75 fpm. The current operation and capture velocities are now adequate to protect employees.

3. Disguise Area

a. The capture velocity for the large canopy averages 75 fpm.

b. The capture velocity for the smaller canopy averages 55 fpm.

c. The capture velocity for the hood in the mold storage area averages 70 fpm.

d. The capture velocity for the hood in the disguise workshop averages 55 fpm.

These capture velocities should be adequate to protect employees in these areas, since the activities are intermittent and usually of relatively short duration.

VI
NOISE

The Occupational Safety and Health Act has set the limit for noise exposure at 90 dBA TWA*. The Office of Medical Services has published guidelines of 85 dBA for an 8 hour day. If this value is exceeded, annual audiograms must be performed on the employees. The following sound level measurements were taken using a GenRad 1982 Sound Level Meter. The values detected, except for a few values in the printing plant, are well below the levels of concern. Printing plant employees should be scheduled for audiograms with the Office of Medical Services.

The following sound levels, in decibels, are included for your information:

South, Room 45	dBa
Front	57, 58, 59, 61
Center	62.5, 63.4
Back	58, 59, 60, 61
Central	
Photoprocessing	
Film Processor	60
Enlarger	65 to 67
Printing Plant	
Heidelberg Offset	74.5, 76, 77, 81
Small Offset	76, 78, 79
Four Color	78, 79
Both Small Offset & Four Color	79, 81
Two Color, Air Compressor	
Back	84
Side	85, 87.3
Front	81, 82
Bindry	84
Folder	85, 86

*Time Weighted Average - the average noise exposure for an eight hour day.

VII

MISCELLANEOUS

A. East Building

1. Rooms 3 & 7

Discourage storage on tops of cabinets and shelving units. Storage of items on tops of cabinets and the tops of shelving racks makes them unstable. The possibility of these tipping and falling on someone is greatly increased by this practice. If it is mandatory to use this space, place only non-breakable and very light items in this position.

2. Female Lockers, GSA

Locate and repair the leak causing water damage to the wall.

3. Second Floor, Women's Rest Room

Clean and ventilate. This room badly needs cleaning, since it smells like an open sewer and is extremely warm.

4. Hallway Outside of Room 226

Discourage storage on the tops of cabinets and shelving units.

5. Room 222

Repair or replace the loose carpet tile to eliminate the tripping hazard.

6. General Condition, East

a. Improve housekeeping.

b. Repair or replace all loose carpet tiles.

c. Marble steps and landings are cracked, chipped and becoming very worn.

B. Central Building

1. Room 218

Remove the ventilation system no longer needed at the microfiche processor.

2. Room 227, left; Room 206, Wig Storage

Replace the missing ceiling tile.

3. Attic, Disguise Storage

Obtain shelving and stack things neatly, maintaining walkways.

4. Hall Outside of Room 100

Replace the missing ceiling tiles.

5. First Floor, Ladies' Room

Clean and paint. Currently it is extremely unsightly.

6. Room 102, Printing

a. Have guards placed on all exposed belts. This area is very crowded for the number of pieces of equipment and types of equipment present. The majority of equipment has moving parts which can not be physically guarded. The closeness of the pieces of equipment increases the possibility of someone being caught in the equipment. The unevenness of the floor again increases the possibility of someone tripping and falling into the equipment.

b. Explore the possibility of installing an external collection system for the buffing operation. Very fine particles of metal are flammable.

7. Room 106

Discontinue the practice of storing food and chemicals in the same refrigerator.

8. Room 9

The tops of cabinets and shelving units should not be used for storage. This practice makes the cabinets or shelving units unstable and increases the possibility

that they will tip over or that something will be knocked over and fall onto someone. If this space is absolutely necessary for storage, only very light, non-breakable items, should be stored in this space.

9. Outside of Room 9

This area in front of the flammable liquid storage cabinet should not be used as a trash repository.

10. Etching Area

Relocate eye wash to position that would be accessible during an emergency.

11. Storage Area behind Guard Desk

Discourage the use of tops of cabinets and shelving units for storage. This practice increases the likelihood for the entire unit to tip over and for objects to fall or be pushed off onto someone.

12. Press Room

a. Correct the in-flow of water under the back door during a rain.

b. Exercise caution when using the U.V. dryer, do not look into the ultraviolet light source. When operating, locate the dryer so that a nearby window or exterior door can be opened slightly to eliminate the build up of ozone.

13. Stairwell, Ground to First Floor

Repair or replace the damaged stair tread.

C. South Building

1. Rooms 125-A & 144

Scrape and paint. The paint is badly flaking off the walls and onto work surfaces and personnel.

2. Stairwell, Room 9, End of Corridor

Keep the area under the stairs free of stored items.

3. Room 18

Determine the cause of the deterioration of the wall joining the GSA Mechanical Room.

4. GSA Mechanical Room

Maintain clear pathways around equipment and eliminate the cause of the standing water.

5. Stairwell, Ground Floor, Restroom End

Keep the area under the stairs free of stored items.

6. Room 45

Correct the water leak causing damage to the ceiling in the rear of the room.

7. Room 45

a. Discourage the use of the tops of cabinets and shelving units for storage. This practice makes the cabinets and shelving units unstable and increases the likelihood of items falling onto someone. If this space is mandatory for storage, only non-breakable and the lightest items should be stored there.

b. Repair the water leak damaging the north wall.

c. Repair or replace the light fixtures.

8. Room 44

Repair or replace the damaged or missing ceiling tile.

9. Room 251

Repair or replace the damaged carpet to the left of the filing cabinets.

10. Room 309

Repair or replace the damaged carpet tile.

11. Room 303

Repair the malfunctioning fluorescent lights.

12. Fourth Floor, Photo Labs

Remove stored items from behind the column that the fuse box is on.

13. Fourth Floor, Restroom

Have the restroom thoroughly cleaned from ceiling to floor.

14. Fourth Floor, Rooms 5 & 6, PMB

Remove excess paper and clean out the room.

15. Fourth Floor, Room 7, EMD

Remove excess paper and clean out the room.

16. Corridor Outside Rooms 1 to 7

Remove trash and stored items.

17. Room 4201B

Remove trash and all excess paper from the access area to the building plumbing.

18. Room 4200

Remove soiled rags.

19. Fourth Floor Stairwell

Remove all debris from the steps.

D. Microwave Ovens

The microwave ovens in the complex are well below the allowable 5 milliwatts per centimeter squared (mW/cm^2) at 5 centimeters from the surface. However, the microwave oven in the Disguise Lab emits approximately $1.0 \text{ mW}/\text{cm}^2$ on the center lower front of the door because the safety glass is cracked and the seal is damaged. The door should be repaired or replaced, since the crack and seal damage will get progressively worse.

VIII

STAT

AREA

A. Rooms 326, 324, 322

1. Secure the freon cylinder to the wall with straps or chains, or secure it to a specially designed cart.

2. Install new carbon dioxide fire extinguishers to replace all of the extinguishers. None of these extinguishers have been inspected since 1972.

3. Install a faceplate on the receptacle at the bench and reduce the impedance to 2 ohms or less in the receptacle.

4. Correct the reversed polarity in the electrical strip at the sink.

IX

EMERGENCY RESPONSE

A. Introduction

Concern was expressed during the health and safety survey about the difficulty of getting rapid emergency care teams to the site. In discussions with the Chief of Support, Deputy Chief of Personnel and the Security Officer, the following procedures were discussed. Parts of the following procedure are already in progress.

B. Cardiopulmonary Resuscitation (CPR) & First Aid

1. Provide periodic CPR and first aid training for compound employees, including the use of the Robert Shaw Resuscitator.

2. Establish regular re-certification training.

3. Maintain index of CPR and first aid certified employees.

4. Establish a locator system to include:

a. Central index of names and extensions for each building.

b. Post names and extensions of certified individuals in accessible locations throughout all of the buildings.

c. Identify each location of certified individuals with signs.

C. Community Emergency Response

Invite area ambulance services and fire departments to the compound and familiarize them with the locations and accessibility of the buildings and any appropriate security restraints.

X

CARCINOGENS

When a known carcinogen such as benzene; suspect carcinogens such as chloroform, dioxane, trichloroethylene and formaldehyde; or materials of unknown toxicity (any materials created for sensitive operations) are being used; the need to identify the risks to Agency employees is critical. Exposure of employees to chemicals where a risk is known to exist, or is at some later date found to exist, presents a very sensitive legal problem unless reasonable precautions are taken. These precautions can include educational programs, laboratory testing of chemicals of unknown toxicity, and written policies and procedures for the use of these chemicals.

XI

MATERIAL SAFETY DATA SHEETS

Material Safety Data Sheets, for certain chemicals used in the areas, are attached for information.

CHEMICAL NAME: ETHANOL, 190 PROOF

SYNONYMS: Ethyl Alcohol, 190 Proof

CHEMICAL FAMILY: Alcohols

FORMULA: C_2H_5OH

TRADE NAME AND SYNONYMS: Ethanol, 190 Proof; Ethyl Alcohol, 190 Proof

I. PHYSICAL DATA

BOILING POINT, 760 mm. Hg	78.2 °C. (172.8 °F.)	FREEZING POINT	-114 °C.
SPECIFIC GRAVITY ($H_2O = 1$)	0.8038 at 20/20 °C.	VAPOR PRESSURE AT 20 °C.	43 mm. Hg
VAPOR DENSITY (air = 1)	1.5	SOLUBILITY IN WATER, % by wt. at 20 °C.	Complete
PER CENT VOLATILES BY VOLUME	100	EVAPORATION RATE (Butyl Acetate = 1)	3.2
APPEARANCE AND ODOR	Water-white liquid; characteristic odor.		

II. HAZARDOUS INGREDIENTS

MATERIAL	%	TLV (Units)
Ethyl Alcohol	~95	1000 ppm. ACGIH OSHA
(See Sections III through VIII)		

III. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	62 °F., Tag closed cup	AUTOIGNITION TEMPERATURE	793 °F.		
FLAMMABLE LIMITS IN AIR, % by volume		LOWER	3.3	UPPER	19.0
EXTINGUISHING MEDIA	Use carbon dioxide or dry chemical for small fires. Use alcohol-type foam for large fires. Addition of water (fog) will aid in reducing burning rate.				
SPECIAL FIRE FIGHTING PROCEDURES	None				
UNUSUAL FIRE AND EXPLOSION HAZARDS	None				

EMERGENCY PHONE NUMBER

304/744-3487

This number is available days, nights, weekends, and holidays.

While Union Carbide Corporation believes that the data contained herein are factual and the opinions expressed are those of qualified experts regarding the results of the tests conducted, the data are not to be taken as a warranty or representation for which Union Carbide Corporation assumes legal responsibility. They are offered solely for your consideration, investigation, and verification. Any use of this data and information must be determined by the user to be in accordance with applicable federal, state and local laws and regulations.

THRESHOLD LIMIT VALUE		Approved For Release 2003/09/04 : CIA-RDP84B00890R000500020013-9	
EFFECTS OF OVEREXPOSURE		Swallowing liquid causes inebriation, headache, nausea, and vomiting. Liquid causes eye irritation. Breathing of vapors may cause drowsiness.	
EMERGENCY AND FIRST AID PROCEDURES		<p>1. If swallowed, do not induce vomiting. Drink plenty of water.</p> <p>2. If inhaled, move to fresh air. If breathing is difficult, call a physician.</p> <p>3. If on skin, wash with soap and water.</p>	

V. REACTIVITY DATA			
STABILITY		CONDITIONS TO AVOID	Avoid heat, sparks, and fire.
UNSTABLE	STABLE		
—	✓		
INCOMPATIBILITY (materials to avoid)		None	
HAZARDOUS DECOMPOSITION PRODUCTS		Thermal decomposition or burning may produce carbon monoxide and/or carbon dioxide.	
HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID	None
May Occur	Will not Occur		
—	✓		

VI. SPILL OR LEAK PROCEDURES	
STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	<p>Eliminate all sources of ignition.</p> <p>Small spills should be flushed with large quantities of water.</p> <p>Larger spills should be collected for disposal.</p>
WASTE DISPOSAL METHOD	Incinerate in a furnace where permitted under appropriate Federal, State, and local regulations.

VII. SPECIAL PROTECTION INFORMATION			
RESPIRATORY PROTECTION (specify type)		Air-supplied mask in confined areas.	
VENTILATION	LOCAL EXHAUST	Preferable	SPECIAL —
	MECHANICAL (general)	Acceptable	OTHER —
PROTECTIVE GLOVES		Plastic	EYE PROTECTION Goggles
OTHER PROTECTIVE EQUIPMENT		Safety shower and eye bath	

VIII. SPECIAL PRECAUTIONS	
ETHANOL, 190 PROOF	
WARNING! FLAMMABLE	
<p>Keep away from heat, sparks, and open flame.</p> <p>Keep container closed.</p> <p>Use with adequate ventilation.</p>	
FOR INDUSTRY USE ONLY	
PRECAUTIONARY LABELING	
OTHER HANDLING AND STORAGE CONDITIONS	

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: NITRIC ACID (55-70%)

OTHER DESIGNATIONS: Aqua Fortis, Hydrogen Nitrate, HNO₃, 55-70% HNO₃ (Aqua Regia)DESCRIPTION: A solution of HNO₃ in water with properties identical to those of pure HNO₃. (See Sections II and III)

MANUFACTURER: Available from many suppliers.

SECTION II. INGREDIENTS AND HAZARDS

Hydrogen nitrate (HNO₃)

Water

55-70%

Balance

HAZARD DATA

TLV 2 ppm^W for
nitric acid

* 68% nitric acid (42°Be) is the constant boiling, concentrated nitric acid of commerce; 56.5% nitric acid (38°Be) is commercially available.

** NIOSH has proposed a 10-hr TWA for this same level

SECTION III. PHYSICAL DATA

	56.5% Acid	68% Acid	100% Acid (Unstable)
Boiling point, 1 atm, deg F (C) ---	---	251 (121.6)	181 (83)
Specific gravity 20/4 C -----	1.36	1.41	1.50
Baume scale, density @ 60 F -----	38°Be	42°Be	---
Melting point, deg F (C) -----	-4 (-20)	ca -30 (-34)	-43.6 (-41.6)
Vapor pressure, mm Hg @ 25C -----	---	---	ca 45
Volatiles @ 122 C: 100 %			
Water solubility: Complete			
Appearance & odor: Water white to slightly yellow liquid with a characteristic NO ₂ odor. (Darkens to brownish color on aging and exposure to light.)			

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air	LOWER	UPPER
Nonflammable	N/A	N/A	---	---

Nitric acid is nonflammable; however it is a strong oxidizing agent and can react with combustible materials to cause fires. (Use water on fires involving nitric acid to dilute the acid and to absorb liberated oxides of nitrogen.) It can also react with metals to liberate flammable hydrogen gas.

Self-contained breathing apparatus should be used by fire fighters in an enclosed area when nitric acid is involved in the fire.

SECTION V. REACTIVITY DATA

This material is stable under normal storage and handling conditions. It is hygroscopic (when concentrated), a strong mineral acid, and a strong oxidizing agent. Contact with organic materials such as wood, paper, alcohol, turpentine, etc., may cause fires. Combustible materials can have an increased flammability after contact with nitric acid. Various nitrogen oxides, including NO, NO₂, N₂O₃, and N₂O -- all mixed with nitric acid mist and vapor -- can be produced upon decomposition or reaction of nitric acid. All are toxic.

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SECTION VI. HEALTH HAZARD INFORMATION

TLV 2 ppm or 5 mg/m³

This material is **Approved For Release 2003/09/04 : CIA-RDP84B00890R000500020013-9**
 Irritation of nitric acid mist or fumes at 2 to 25 ppm, over an 8 hour period, may cause pulmonary irritation and symptoms of lung damage. The onset of symptoms following inhalation may be delayed for several hours. Concentrations over 200 ppm can cause severe pulmonary damage and may be fatal (in 5-10 hours) after several minutes of exposure. Eye contact will produce immediate burns, with a yellow skin discoloration; eyes are continuously irrigated. Ingestion will produce burns of the digestive tract.

Inhalation - Remove victim to fresh air. Get medical attention. Respire for 30 hours after exposure.

Skin contact - Wash immediately with soap and water. (Remove contaminated clothing promptly.) Get medical attention except for minor exposures to small areas of the skin.

Eye contact - Immediately wash with water for at least 15 min. Get medical attention.

Ingestion - Give 3 or more glasses of milk or water. Get medical attention.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel. Provide adequate ventilation. Eliminate sources of ignition. Self-contained breathing apparatus should be used by personnel when cleaning up spills. Neoprene gloves and body shields should be used to prevent skin and clothing contact. Surfaces contaminated from spills should be covered with sodium bicarbonate or soda ash to neutralize the acid. Wash the neutralized slurry down the drain with excess water. Federal, state, and local regulations must always be considered prior to sewer disposal. If necessary, neutralized spill may be picked up by use of absorbents and disposed of as solid waste in a landfill.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Use with proper ventilation; exhaust hoods should maintain a face velocity of 100 fpm minimum. Respirators used should be self-contained or air supplied with full face piece. Neoprene gloves and body shields should be used where splashing may occur. Exhaust ducts should be fiberglass or other acid resistant material. Chemical safety showers and eye wash stations must be readily available in areas of storage and handling of nitric acid.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Nitric acid is a corrosive material and will attack skin, metals and many organic substances. The nitrogen oxides produced from the acid are all toxic, and proper ventilation should always be used.

Nitric acid can ignite certain organic substances. Store in a clean, cool, well-ventilated area, away from organic chemicals, strong bases, metal powders, carbides, sulfides, and any readily oxidizable material. Protect from direct sunlight.

Neutralizing and absorbing materials such as soda ash and sand should be readily available to areas of use and storage of nitric acid.

DOT labeling - OXIDIZER and CORROSIVE

Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, General Electric Company extends no warranty, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.

APPROVED: *[Signature]*

Industrial Hygienist and
 Chemical Safety Coordinator,
 GE Electronics Laboratory
 Syracuse, NY 13201

GENERAL  ELECTRIC

144
55 PMB - Counter top

PRODUCT NAME: ACETIC ACID, 84%	
CHEMICAL NAME: ---	CHEMICAL FAMILY: Acid-water mixture
FORMULA: ---	MOLECULAR WEIGHT: ---
SYNONYMS: ---	
DEPARTMENT OF TRANSPORTATION	HAZARD CLASSIFICATION: Corrosive Material
	SHIPPING NAME: Acetic Acid
CAS # 64-19-7	CAS NAME: Acetic Acid

II. PHYSICAL DATA

BOILING POINT, 760 mm. Hg.	107.5 °C. (225.5 °F.)	FREEZING POINT	1 °C.
SPECIFIC GRAVITY (H ₂ O = 1)	1.0703 at 20/20 °C.	VAPOR PRESSURE at 20 °C.	13 mm. Hg
VAPOR DENSITY (air = 1)	2.1 (Acetic acid)	SOLUBILITY IN WATER, % by wt.	Complete
PER CENT VOLATILES BY VOLUME	100	EVAPORATION RATE (Butyl Acetate = 1)	0.99
APPEARANCE AND ODOR	Water-white liquid; sharp odor.		

III. HAZARDOUS INGREDIENTS

MATERIAL	%	TLV (Units)	HAZARD
Acetic Acid	84	10 ppm.	Corrosive; Combustible
Water	16	---	---

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT [test method(s)]	131 °F., Tag closed cup ASTM D 56		
FLAMMABLE LIMITS IN AIR, % by volume	LOWER	5.4 (Acetic acid)	UPPER 16 (Acetic acid)
EXTINGUISHING MEDIA	Use water spray, carbon dioxide, dry chemical, alcohol-type or universal-type foams applied by manufacturer's recommended technique.		
SPECIAL FIRE FIGHTING PROCEDURES	Use supplied breathing air.		
UNUSUAL FIRE AND EXPLOSION HAZARDS	None		

EMERGENCY PHONE NUMBER

304/744-3487

This number is available days, nights, weekends, and holidays.

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LEVEL AND SOURCE: 10 ppm. ACGIH (1973) OSHA 29 CFR 1910.33 tables

ACUTE EFFECTS OF OVEREXPOSURE

SWALLOWING	Burning abdominal pain. Shock state. Diarrhea.
SKIN ABSORPTION	None currently known
INHALATION	Irritation, coughing, chest pain.
SKIN CONTACT	Causes burns
EYE CONTACT	Causes burns
CHRONIC EFFECTS OF OVEREXPOSURE	None currently known
OTHER HEALTH HAZARDS	None currently known

EMERGENCY AND FIRST AID PROCEDURES:

SWALLOWING	Do not induce vomiting. Dilute acid by drinking at least 2 glasses of water or milk if available. Call a physician.
SKIN	Flush with water and remove contaminated clothing.
INHALATION	Remove to fresh air. Give oxygen if breathing is difficult. Call a physician.
EYES	Immediately flush eyes with plenty of water for at least 15 minutes. Call a physician at once.

NOTES TO PHYSICIAN

Acetic acid may cause burns of mouth, esophagus, and stomach. If absorbed into the body by inhalation, from the gut or possibly through skin, it may cause severe acid-base balance disturbance. Acetic acid has a normal metabolic pathway in humans.

VI. REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID	None
UNSTABLE	STABLE		
---	✓		

INCOMPATIBILITY (materials to avoid) Avoid contamination with alkalis, amines, and strong acid.

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS Burning may produce carbon dioxide and/or carbon monoxide.

HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID	None
May Occur	Will not Occur		
---	✓		

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	Wear suitable protective equipment. Collect for disposal. Toxic to fish! Avoid discharge to natural waters.
WASTE DISPOSAL METHOD	Incinerate in a furnace where permitted under appropriate Federal, State, and local regulations.

VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)	Air-supplied mask in high concentrations.		
VENTILATION	This product should be confined within sealed drums, covered tanks, etc. If this is done, normal ventilation may be adequate. If it is not confined, localized ventilation is needed at points where vapors can escape to the air.		
PROTECTIVE GLOVES	Rubber or plastic	EYE PROTECTION	Safety goggles
OTHER PROTECTIVE EQUIPMENT	Eye bath and safety shower		

IX. SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Do not get in eyes, on skin, on clothing.
 Avoid breathing vapor.
 Keep away from heat and open flame.
 Keep container closed.
 Use with adequate ventilation.
 Wash thoroughly after handling.

FOR INDUSTRY USE ONLY

OTHER PRECAUTIONS

None

MATERIAL SAFETY DATA SHEET

101
#7

Approved For Release 2003/09/04 : CIA-RDP84B00890R000500020013-9

I. PRODUCT IDENTIFICATION

MANUFACTURER'S NAME	UNION RUBBER, INC.	REGULAR TELEPHONE NO.	(609) 396-9323
		EMERGENCY TELEPHONE NO.	(609) 396-9323
ADDRESS	232 Allen Street, Trenton, New Jersey 08606 P.O. Box 1040		
TRADE NAME	BESTINE Solvent & Thinner		
SYNONYMS	Commercial hexane		
SHIPPING NAME	Petroleum naphtha		
CLASSIFICATION	Solvent		

II. HAZARDOUS INGREDIENTS²

MATERIAL OR COMPONENT	CAS NO.	%	HAZARD DATA
Commercial hexane	64742-89-8	100.	Extremely flammable liquid

III. PHYSICAL DATA

BOILING POINT, 760 MM HG	149° F	MELTING POINT	Liquid
SPECIFIC GRAVITY (H ₂ O = 1)	0.68	VAPOR PRESSURE @ 100° F	6.4 psi
VAPOR DENSITY (AIR = 1)	3.0	SOLUBILITY IN H ₂ O % BY WT	Negligible
% VOLATILES BY VOL.	100.0	EVAPORATION RATE (BUTYL ACETATE = 1)	15.8
APPEARANCE AND ODOR	Water-White liquid Mild hydrocarbon odor	Pn (AS IS) Pn (1% SOLN.)	Not applicable

IV. FIRE AND EXPLOSION DATA

FLASH POINT (TEST METHOD)	< 0° F Tag Closed Cup		AUTOIGNITION TEMPERATURE	615° F
FLAMMABLE LIMITS IN AIR, % BY VOL.	LOWER	1.2	UPPER	6.9
EXTINGUISHING MEDIA	Foam, dry chemical, CO ₂ , water spray or fog.			
SPECIAL FIRE FIGHTING PROCEDURES	Use air-supplied rescue equipment for enclosed areas. Cool exposed containers with water.			
UNUSUAL FIRE AND EXPLOSION HAZARD	Do not store or mix with strong oxidants. Extremely flammable liquid.			

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HEALTH HAZARD DATA	HAZARD CLASSIFICATION	BASIS FOR CLASSIFICATION	SOURCE
ROUTES OF EXPOSURE			
INHALATION	Slightly toxic	70,000 ppm 4 hrs. exposure < LD ₅₀ (rat)	Exxon Corp.
SKIN CONTACT	Slightly toxic	Defats the skin which can cause irritation and dermatitis.	Exxon Corp.
SKIN ABSORPTION	None	Not absorbed	Exxon Corp.
EYE CONTACT	Mild irritant	Does not injure eye tissue.	Exxon Corp.
INGESTION	Slightly toxic	25 ml/Kg < LD ₅₀ (rat)	Exxon Corp.

EFFECTS OF OVEREXPOSURE

ACUTE OVEREXPOSURE Headaches, dizziness and in extreme cases - unconsciousness.

CHRONIC OVEREXPOSURE In excess of 500 ppm, can cause peripheral polyneuropathy.

EMERGENCY AND FIRST AID PROCEDURES

EYES: Flush with water continuously until irritation subsides.

SKIN: Remove contaminated clothing, wash with soap and water.

INHALATION: Remove from exposure immediately. If breathing is irregular or stopped, start resuscitation, administer oxygen.

INGESTION: Keep subject calm and at rest. Do not induce vomiting.
Call a physician.

NOTES TO PHYSICIAN

IS CONTRIBUTING TO INSTABILITY

Stable material.

INCOMPATIBILITY

Strong oxidants such as liquid chlorine and concentrated oxygen.

HAZARDOUS DECOMPOSITION PRODUCTS

Carbon monoxide in the event of incomplete combustion.

CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION

Does not occur.

VII DISPOSAL, SPILL OR LEAK PROCEDURES

AQUATIC TOXICITY (E.G. 96 HR. TLM):

Not applicable.

WASTE DISPOSAL METHOD

Dispose of waste by incineration under supervision or in a chemical disposal area in compliance with local regulations.

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Remove all ignition sources. Keep people away. Recover free liquid. Add absorbent to the spill area. Avoid breathing vapors. Ventilate enclosed spaces. Open all windows and doors. Keep out of public sewers, streams and waterways.

NEUTRALIZING CHEMICALS

None

VIII SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

Positive ventilation of the work area is essential to prevent build-up of vapor concentration.

SPECIFIC PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY (SPECIFY IN DETAIL)

Not needed.

EYE

Not needed.

GLOVES
(FIG)

Not needed.

OTHER CLOTHING AND EQUIPMENT

No special clothing or equipment needed.

PRECAUTIONARY STATEMENTS CAUTION - FLAMMABLE MIXTURE. DO NOT USE NEAR FIRE OR FLAME. Danger: Extremely Flammable. Keep away from heat, sparks and open flame. Contains petroleum distillates. Use with adequate ventilation. Avoid contact with the skin. Close can when not in use. If swallowed, do not induce vomiting, call a physician. Keep out of the reach of children.

OTHER HANDLING AND STORAGE REQUIREMENTS

Store in a cool location.

Do not store with strong oxidants.

ADDITIONAL REGULATORY CONCERNS

FEDERAL:

FDA

USDA

CPSC

TSCA IS THIS PRODUCT, OR ALL ITS INGREDIENTS, BEING CERTIFIED FOR INCLUSION ON THE TOXIC SUBSTANCES CONTROL ACT INVENTORY OF CHEMICAL SUBSTANCES? Yes

OTHER TLV - Threshold Limit Value - 100 ppm for 8-hour workday, 40-hour week

STATE:

PREPARED BY John R. Mills

TITLE: Technical Consultant to

COMPANY: UNION RUBBER, INC.

ADDRESS: Trenton, New Jersey 08609

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing,
Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

43.930

SECTION I

MANUFACTURER'S NAME 3M COMPANY		EMERGENCY TELEPHONE NO. (612) 733-1110
ADDRESS (Number, Street, City, State, and ZIP Code) 3M CENTER, ST. PAUL, MINNESOTA 55101		
CHEMICAL NAME AND SYNONYMS		TRADE NAME AND SYNONYMS 3M Brand Subtractive Plate
CHEMICAL FAMILY	FORMULA Developer	

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					
HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES				%	TLV (Units)
N-propyl alcohol				< 40	200

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)		SPECIFIC GRAVITY (H ₂ O=1) @ 15.5°C	0.947
VAPOR PRESSURE (mm Hg.)		PERCENT VOLATILE BY VOLUME (%) WT.	30-40
VAPOR DENSITY (AIR=1)		EVAPORATION RATE (_____ =1)	
SOLUBILITY IN WATER	Sol.	pH	6.75-7.2
APPEARANCE AND ODOR Clear - mild odor			

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) 87°F T.C.C.	FLAMMABLE LIMITS	Lel	Uel
EXTINGUISHING MEDIA CO₂, foam, dry chemicals			
SPECIAL FIRE FIGHTING PROCEDURES None			
UNUSUAL FIRE AND EXPLOSION HAZARDS			

Sub. Plate Dev.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

See Section II

EFFECTS OF OVEREXPOSURE

Vapors may be irritating to the eyes, nose and throat. Liquid may irritate eyes.

EMERGENCY AND FIRST AID PROCEDURES

INHALATION - provide fresh air. EYE contact - flush with water.

Consult a physician. SKIN contact - wash with soap and water.

SECTION VI - REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	
INCOMPATIBILITY (Materials to avoid)			
HAZARDOUS DECOMPOSITION PRODUCTS			
HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Collect spilled material. Wash down area.

WASTE DISPOSAL METHOD

Material should receive adequate treatment in wastewater disposal facilities. Large volumes of material may be bled into sewage systems.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)

VENTILATION	LOCAL EXHAUST	SPECIAL
	MECHANICAL (General) X	OTHER
PROTECTIVE GLOVES		EYE PROTECTION X
OTHER PROTECTIVE EQUIPMENT		

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Avoid eye contact. Keep from freezing. Store at 60-80°F. Keep from heat and sparks.

OTHER PRECAUTIONS

None

Salicylic acid	1.
Polyethylene lauryl ethers	5.
Fatty alcohol hair conditioners	
Propylene glycol	

Sustained-release vita
(S&S)
Each capsule:
Nicotinamide
Vitamin A
Vitamin D
Plus poly-vitamins

Approved For Release 2005/09/02 : CIA-RDP84B00890R000500020013-9

BUTYL BUTANOATE

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General Information

Colorless liquid.

Formula: $(CH_3)_3CO_2CH_2CH_2CH_2CH_3$
Mol wt: 137.0; mp: -20°C; bp: 73.3°C; $d_4^{20} = 0.813$ C; $d_4^{25} = 0.805$ C.

Hazard Analysis

Toxicity: Unknown. See also chlorinated HC. Lethal.
Disaster Hazard: Moderately dangerous; when heated to decomposition, it emits toxic fumes.

Countermeasures

Storage and Handling: Section 7.

BUTYL BUTANOATE: See n-butyl butyrate.

n-BUTYL BUTYRATE

General Information

Synonym: butyl butanoate.

Liquid.

Formula: $CH_3CH_2CH_2CH_2CO_2CH_2CH_2CH_2CH_3$
Mol wt: 144.2; mp: -16°C; flash p.: 23°F (O.C.); $d_4^{20} = 0.874$; $d_4^{25} = 0.861$ C.

Hazard Analysis

Toxic Hazard Rating:

Acute Local: Irritant 2.

Acute Systemic: Irritant 2.

Chronic Local: Irritant 1.

Chronic Systemic: U.

Toxicology: Irritating and narcotic; high concentration.

Fire Hazard: Moderate; when exposed to heat or flame,

it can react with oxidizing materials.

Countermeasures:

Ventilation Control: Section 2.

Personnel Protection: Section 2.

To Fight Fire: Alcohol foam, foam, carbon dioxide,

dry chemical, or carbon tetrachloride (Section 7).

Storage and Handling: Section 7.

BUTYL CARBINOL: See amyl alcohol.

n-BUTYL CARBINOL: See pentanol.

sec-BUTYL CARBINOL: See sec-amyl alcohol.

tert-BUTYL CARBINOL: See tert-amyl alcohol.

BUTYL CARBITOL

General Information

Synonym: diethylene glycol monobutyl ether.

Colorless liquid.

Formula: $C_4H_9OCH_2CH_2OCH_2CH_2OH$ Mol wt: 162.2; mp: -68°C; bp: 230.6°C; flash p.: 22°F; $d_4^{20} = 1.13$; $d_4^{25} = 1.12$ C; autoign. temp.: 442°F;

vap. press.: 0.02 mm at 20°C; vap. d.: 5.58 at 20°C.

Hazard Analysis

Toxicity: See glycols.

Fire Hazard: Moderate; when exposed to heat or flame,

it emits degradation products; can react with oxidizing materials.

Spontaneous Heating: No.

Countermeasures

Storage and Handling: Section 7.

To Fight Fire: Alcohol foam, carbon dioxide, dry chem-

ical, or carbon tetrachloride (Section 7).

Storage and Handling: Section 7.

BUTYL CARBITOL ACETATE

General Information

Synonym: diethylene glycol monobutyl ether acetate.

Colorless liquid.

Formula: $C_4H_9O(CH_2)_2O(CCH_3)_2$

Mol wt: 204.26; mp: -32.2°C; bp: 147°C; flash p.: 240°F

(O.C.); $d_4^{20} = 0.931$ at 20°/20°C; autoign. temp.: 570°F;

vap. press.: < 0.01 mm at 20°C.

Hazard Analysis

Toxicity: See glycols.

Fire Hazard: Moderate; when exposed to heat or flame,

it emits degradation products; can react with oxidizing materials.

Spontaneous Heating: No.

Countermeasures

Storage and Handling: Section 7.

To Fight Fire: Alcohol foam, carbon dioxide, dry chem-

ical, or carbon tetrachloride (Section 7).

Storage and Handling: Section 7.

BUTYL "CELLOSOLVE"

General Information

Synonym: glycol monobutyl ether.

Colorless liquid.

Formula: $C_4H_9OCH_2CH_2OH$ Mol wt: 118.17; mp: < -40°C; bp: 111.2°C; flash p.: 141°F (C.C.); $d_4^{20} = 0.9027$ at 20°/4°C; autoign. temp.: 472°F;

vap. press.: 0.6 mm at 20°C; vap. d.: 1.0 at 20°C.

Hazard Analysis

Toxicity: See glycols.

Fire Hazard: Moderate; when exposed to heat or flame,

it emits degradation products; can react with oxidizing materials.

Spontaneous Heating: No.

Countermeasures

Storage and Handling: Section 7.

To Fight Fire: Alcohol foam, carbon dioxide, dry chem-

ical, or carbon tetrachloride (Section 7).

Storage and Handling: Section 7.

BUTYL "CELLOSOLVE" ACETATE

General Information

Synonym: glycol monobutyl ether acetate.

Liquid.

Formula: $C_4H_9O(CH_2)_2O(CCH_3)_2$ Mol wt: 190.20; bp: 138°C; flash p.: 130°F (O.C.); $d_4^{20} = 0.943$; vap. d.: 5.5.

Hazard Analysis

Toxicity: See glycols.

Fire Hazard: Moderate; when exposed to heat or flame,

it emits degradation products; can react with oxidizing materials.

Spontaneous Heating: No.

Countermeasures

Storage and Handling: Section 7.

To Fight Fire: Alcohol foam, carbon dioxide, dry chem-

ical, or carbon tetrachloride (Section 7).

Storage and Handling: Section 7.

BUTYL "CELLOSOLVE" ACETATE

General Information

Synonym: glycol monobutyl ether acetate.

Liquid.

Formula: $C_4H_9O(CH_2)_2O(CCH_3)_2$ Mol wt: 190.20; bp: 138°C; flash p.: 130°F (O.C.); $d_4^{20} = 0.943$; vap. d.: 5.5.

Hazard Analysis

Toxicity: See glycols.

Fire Hazard: Moderate; when exposed to heat or flame,

it emits degradation products; can react with oxidizing materials.

Spontaneous Heating: No.

Countermeasures

Storage and Handling: Section 7.

To Fight Fire: Alcohol foam, carbon dioxide, dry chem-

ical, or carbon tetrachloride (Section 7).

Storage and Handling: Section 7.

BUTYL "CELLOSOLVE" ACETATE

General Information

Synonym: glycol monobutyl ether acetate.

Liquid.

Formula: $C_4H_9O(CH_2)_2O(CCH_3)_2$ Mol wt: 190.20; bp: 138°C; flash p.: 130°F (O.C.); $d_4^{20} = 0.943$; vap. d.: 5.5.

Hazard Analysis

Toxicity: See glycols.

Fire Hazard: Moderate; when exposed to heat or flame,

it emits degradation products; can react with oxidizing materials.

Spontaneous Heating: No.

Countermeasures

Storage and Handling: Section 7.

To Fight Fire: Alcohol foam, carbon dioxide, dry chem-

ical, or carbon tetrachloride (Section 7).

Storage and Handling: Section 7.

BUTYL "CELLOSOLVE" ACETATE

General Information

Synonym: glycol monobutyl ether acetate.

Liquid.

Formula: $C_4H_9O(CH_2)_2O(CCH_3)_2$ Mol wt: 190.20; bp: 138°C; flash p.: 130°F (O.C.); $d_4^{20} = 0.943$; vap. d.: 5.5.

Hazard Analysis

Toxicity: See glycols.

Fire Hazard: Moderate; when exposed to heat or flame,

it emits degradation products; can react with oxidizing materials.

Spontaneous Heating: No.

Countermeasures

Storage and Handling: Section 7.

To Fight Fire: Alcohol foam, carbon dioxide, dry chem-

ical, or carbon tetrachloride (Section 7).

Storage and Handling: Section 7.

BUTYL "CELLOSOLVE" ACETATE

General Information

Synonym: glycol monobutyl ether acetate.

Liquid.

Formula: $C_4H_9O(CH_2)_2O(CCH_3)_2$ Mol wt: 190.20; bp: 138°C; flash p.: 130°F (O.C.); $d_4^{20} = 0.943$; vap. d.: 5.5.

Hazard Analysis

Toxicity: See glycols.

Fire Hazard: Moderate; when exposed to heat or flame,

it emits degradation products; can react with oxidizing materials.

Spontaneous Heating: No.

Countermeasures

Storage and Handling: Section 7.

To Fight Fire: Alcohol foam, carbon dioxide, dry chem-

ical, or carbon tetrachloride (Section 7).

Storage and Handling: Section 7.

BUTYL "CELLOSOLVE" ACETATE

General Information

Synonym: glycol monobutyl ether acetate.

Liquid.

Formula: $C_4H_9O(CH_2)_2O(CCH_3)_2$ Mol wt: 190.20; bp: 138°C; flash p.: 130°F (O.C.); $d_4^{20} = 0.943$; vap. d.: 5.5.

Hazard Analysis

Toxicity: See glycols.

Fire Hazard: Moderate; when exposed to heat or flame,

it emits degradation products; can react with oxidizing materials.

Spontaneous Heating: No.

Countermeasures

Storage and Handling: Section 7.

To Fight Fire: Alcohol foam, carbon dioxide, dry chem-

ical, or carbon tetrachloride (Section 7).

Storage and Handling: Section 7.

BUTYL "CELLOSOLVE" ACETATE

General Information

Synonym: glycol monobutyl ether acetate.

Liquid.

Formula: $C_4H_9O(CH_2)_2O(CCH_3)_2$ Mol wt: 190.20; bp: 138°C; flash p.: 130°F (O.C.); $d_4^{20} = 0.943$; vap. d.: 5.5.

Hazard Analysis

Toxicity: See glycols.

Fire Hazard: Moderate; when exposed to heat or flame,

it emits degradation products; can react with oxidizing materials.

Spontaneous Heating: No.

Countermeasures

Storage and Handling: Section 7.

To Fight Fire: Alcohol foam, carbon dioxide, dry chem-

ical, or carbon tetrachloride (Section 7).

Storage and Handling: Section 7.

BUTYL "CELLOSOLVE" ACETATE

General Information

Synonym: glycol monobutyl ether acetate.

Liquid.

Formula: $C_4H_9O(CH_2)_2O(CCH_3)_2$ Mol wt: 190.20; bp: 138°C; flash p.: 130°F (O.C.); $d_4^{20} = 0.943$; vap. d.: 5.5.

Hazard Analysis

Toxicity: See glycols.

Fire Hazard: Moderate; when exposed to heat or flame,

it emits degradation products; can react with oxidizing materials.

Spontaneous Heating: No.

Countermeasures

Storage and Handling: Section 7.

To Fight Fire: Alcohol foam, carbon dioxide, dry chem-

ical, or carbon tetrachloride (Section 7).

Storage and Handling: Section 7.

BUTYL "CELLOSOLVE" ACETATE

General Information

Synonym: glycol monobutyl ether acetate.

Liquid.

Formula: $C_4H_9O(CH_2)_2O(CCH_3)_2$ Mol wt: 190.20; bp: 138°C; flash p.: 130°F (O.C.); $d_4^{20} = 0.943$; vap. d.: 5.5.

Hazard Analysis

Toxicity: See glycols.

Fire Hazard: Moderate; when exposed to heat or flame,

it emits degradation products; can react with oxidizing materials.

Spontaneous Heating: No.

Countermeasures

Storage and Handling: Section 7.

To Fight Fire: Alcohol foam, carbon dioxide, dry chem-

ical, or carbon tetrachloride (Section 7).

Storage and Handling: Section 7.

BUTYL "CELLOSOLVE" ACETATE

General Information

Synonym: glycol monobutyl ether acetate.

Liquid.

Formula: $C_4H_9O(CH_2)_2O(CCH_3)_2$ Mol wt: 190.20; bp: 138°C; flash p.: 130°F (O.C.); $d_4^{20} = 0.943$; vap. d.: 5.5.

Hazard Analysis

Toxicity: See glycols.

Fire Hazard: Moderate; when exposed to heat or flame,

it emits degradation products; can react with oxidizing materials.

Spontaneous Heating: No.

Countermeasures

Storage and Handling: Section 7.

To Fight Fire: Alcohol foam, carbon dioxide, dry chem-

ical, or carbon tetrachloride (Section 7).

Storage and Handling: Section 7.

BUTYL "CELLOSOLVE" ACETATE

General Information

Synonym: glycol monobutyl ether acetate.

Liquid.

Formula: $C_4H_9O(CH_2)_2O(CCH_3)_2$ Mol wt: 190.20; bp: 138°C; flash p.: 130°F (O.C.); $d_4^{20} = 0.943$; vap. d.: 5.5.

Hazard Analysis

Toxicity: See glycols.

Fire Hazard: Moderate; when exposed to heat or flame,

it emits degradation products; can react with oxidizing materials.

Spontaneous Heating: No.

Countermeasures

Storage and Handling: Section 7.

To Fight Fire: Alcohol foam, carbon dioxide, dry chem-

ical, or carbon tetrachloride (Section 7).

Storage and Handling: Section 7.

BUTYL "CELLOSOLVE" ACETATE

General Information

Synonym: glycol monobutyl ether acetate.

Liquid.

Formula: $C_4H_9O(CH_2)_2O(CCH_3)_2$ Mol wt: 190.20; bp: 138°C; flash p.: 130°F (O.C.); $d_4^{20} = 0.943$; vap. d.: 5.5.

Hazard Analysis

Toxicity: See glycols.

Fire Hazard: Moderate; when exposed to heat or flame,

it emits degradation products; can react with oxidizing materials.

Spontaneous Heating: No.

Countermeasures

Storage and Handling: Section 7.

To Fight Fire: Alcohol foam, carbon dioxide, dry chem-

ical, or carbon tetrachloride (Section 7).

Storage and Handling: Section 7.

BUTYL "CELLOSOLVE" ACETATE

General Information

Synonym: glycol monobutyl ether acetate.

Liquid.

Formula: $C_4H_9O(CH_2)_2O(CCH_3)_2$ Mol wt: 190.20; bp: 138°C; flash p.: 130°F (O.C.); $d_4^{20} = 0.943$; vap. d.: 5.5.

Hazard Analysis

Toxicity: See glycols.

Fire Hazard: Moderate; when exposed to heat or flame,

it emits degradation products; can react with oxidizing materials.

Spontaneous Heating: No.

Countermeasures

Storage and Handling: Section 7.

To Fight Fire: Alcohol foam, carbon dioxide, dry chem-</

ALMOND OIL, BITTER

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Chronic Systemic: 0.
Toxicology: A weak sensitizer. Contact dermatitis may result from local contact (Section 9).
Fire Hazard: Slight, when exposed to heat or flame.
Countermeasures:
To Fight Fire: Use alcohol foam, dry chemical, water.
Personal Hygiene: Section 2.
Storage and Handling: Section 7.

ALMOND OIL, BITTER

General Information:
Colorless oil, which turns to yellow, bitter almond odor.
Composition: Chief known constituents are benzaldehyde, hydrocyanic acid, benzaldehyde cyanohydrin.
Bp 177°C, d₄²⁰ 0.910-0.915°C.

Hazard Analysis:
Toxic Hazard: Rating: Unknown, depends upon purity of sample. An allergenic, it can be quite toxic if it has not been separated from its hydrogen cyanide. Weak sensitizer may cause contact dermatitis (Section 9).
Fire Hazard: Slight, when exposed to heat or flame (Section 9).
Disaster Hazard: Dangerous. See cyanides.
Countermeasures:
Personal Hygiene: Section 2.
Storage and Handling: Section 7.

ALMOND OIL, EXPRESSED: See almond oil.

ALMOND OIL, SWEET: See almond oil.

ALODANE: See 1,2,3,4,5,6-hexachloro-5,6-bis-(chloromethyl)-2-norbornene.

ALPERON CS: See lauroyl peroxide.

ALPHA RAYS

General Information:
Particulate radiation emitted by certain radioactive isotopes. Alpha rays consist of heavy charged particles (helium nuclei) moving at high velocity. See Section 3.
Hazard Analysis:
Radiation Hazard: A recognized carcinogenic agent. See Sections 3 and 7.

ALPHASOLIDE: See disobutyl sodium sulfosuccinate.

ALROSEPT-MBC: See 1-tridecyl-2-benzyl-2-hydroxy-2-imidazolium chloride.

ALROSEPT-MM: See 2-tridecyl-2-methyl-2-hydroxy-2-imidazolium chloride.

ALTATITE: See lead telluride.

ALUM: See aluminum sulfate.

General Information:
Synonym: potassium aluminum sulfate.
Colorless crystals.
Formula: $KAl(SO_4)_2 \cdot 12H_2O$.
Mol wt: 474.39, mp: 92.5°C, d: 1.725.

Hazard Analysis:
Toxic Hazard Rating:
Acute Local: Irritant 1; Allergen 1; Ingestion 1; Inhalation 1.
Acute Systemic: 0.
Chronic Local: Irritant 1; Allergen 1.
Chronic Systemic: 0.

Toxicology: A general purpose food additive, it may migrate to food from packaging materials (Section 10). A weak sensitizer. Local contact may cause contact dermatitis (Section 9).

* This material has been assigned a Threshold Limit Value by ACGIH. See complete reprint of TLV's in Section 1.

Countermeasures

Ventilation Control: Section 2.
Personal Hygiene: Section 2.

ALUM, AMYNTIA: See Aluminum Amylamine.

ALUMINA

General Information:
Synonym: aluminum oxide.
White powder.
Formula: Al_2O_3 .
Mol wt: 101.96, mp: 2054°C, bp: 2980°C, d: 3.95.
Hazard Analysis:

Toxic Hazard Rating:
Acute Local: Inhalation 1.
Acute Systemic: 0.
Chronic Local: Inhalation 2.
Chronic Systemic: 0.

Toxicology: There has been some record of lung damage due to the inhalation of finely divided aluminum oxide particles. However, this effect, known as Shaver's disease, is complicated by the presence in the inhaled air of such as silica and oxides of iron. A nuisance particulate.

Countermeasures

Ventilation Control: Section 2.

ALUMINA TRIHYDRATE: See Aluminum Hydroxide.

ALUMINUM

General Information:
A silvery ductile metal.
Formula: Al .
At Wt: 26.97, mp: 660°C, bp: 2056°C, d: 2.70.
press.: 1 mm at 1284°C.

Hazard Analysis

Toxic Hazard Rating:
Acute Local: 0.
Acute Systemic: 0.
Chronic Local: Inhalation 2.
Chronic Systemic: 0.

Toxicology: Aluminum is not generally regarded as an industrial poison. Inhalation of finely divided aluminum powder has been reported as a cause of pulmonary fibrosis.

Fire Hazard: of Dust: Moderate, when exposed to flame or by chemical reaction.

Spontaneous Heating: No.

Explosion Hazard: of Dust: Moderate, when exposed to heat or flame.

Countermeasures

Ventilation Control: Section 2.

To Fight Fire: Special mixtures of dry chemical (Section 7).

ALUMINUM ACETATE

General Information:
Amorphous white powder.
Formula: $Al(CH_3COO)_3$.
Mol wt: 204.1, mp: decomposes.

Hazard Analysis

Toxic Hazard Rating:
Acute Local: Irritant 1.
Acute Systemic: 0.
Chronic Local: Irritant 1.
Chronic Systemic: 0.

Toxicology: Weak sensitizer. Local contact may cause contact dermatitis (Section 9).

Countermeasures

Personal Hygiene: Section 2.

Note: For an in-depth discussion of storage and handling and control of fires see Section 7.

ALUMINUM ACETO

acetate.

ALUMINUM ALKYL

General Information:

Spontaneous heating.

Formula: AlR_3 .

Mol wt: 101.96.

Hazard Analysis:

Toxic Hazard Rating:

Acute Local: Irritant 1.

Acute Systemic: 0.

Chronic Local: Irritant 1.

Chronic Systemic: 0.

Toxicology: A mild skin food additive. See Section 7.

Disaster Hazard: Dangerous.

ALUMINUM O-ALUM

General Information:

White powder.

Formula: $Al_2O_3 \cdot 3H_2O$.

Mol wt: 310.17, d: 3.011.

Hazard Analysis:

See arsenic compounds.

ALUMINUM ARSENI

General Information:

A solid.

Formula: $AlAs$.

Mol wt: 101.9.

Hazard Analysis:

See arsenic compounds.

ALUMINUM BENZO

General Information:

Crystalline powder; very

Formula: $Al(C_6H_5O_2)_3$.

Mol wt: 390.3.

Hazard Analysis:

Toxic Hazard Rating:

toxicity. See also al

ALUMINUM BORIDE

General Information:

Powder.

Hazard Analysis:

See aluminum, also

ALUMINUM BORON

General Information:

White lustrous scales; fo

Composition: 33% Al, 66% B, 1% H₂O.

Hazard Analysis:

See aluminum, also

ALUMINUM BORON

General Information:

Liquid.

Formula: AlB_2H_4 .

Mol wt: 71.53, bp: 44

400 mm at 23.1°C.

Hazard Analysis:

0 NONE: (a) No harm only under unusual co

1 SLIGHT: Causes to appear after end of ex

2 MODERATE: May i

MATERIAL SAFETY DATA SHEET

CORPORATE RESEARCH DIVISION, GEORGIA INSTITUTE OF TECHNOLOGY
 Approved For Release 2003/09/04 : CIA-RDP84B00890R000500020013-9

SCHENECTADY, N. Y.

HAZARD
 INFORMATION

OXALIC ACID

Date November 1977

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: OXALIC ACID
 OTHER DESIGNATIONS: Ethanedioic Acid, $\text{HO}_2\text{C}-\text{CO}_2\text{H}$, GE Material DATA, CASH 600 144 627
 MANUFACTURER: Available from many suppliers.

SECTION II. INGREDIENTS AND HAZARDS

Oxalic Acid

ca 100

HAZARD DATA

TLV 1 mg/m³

Human, oral LDLo
 100 mg/kg

SECTION III. PHYSICAL DATA

	Anhydrous acid	Dihydrate*	ph of 0.1M solution in H ₂ O
Melting point	189.5 C (dec)	101 C (dec)**	20 C ----- 1.3
Sublimation at 1 atm	157 C**	—	Molecular weight of
Specific gravity, 18/4°C	1.9	1.65	anhydrous acid ----- 90.04
Solubility in H ₂ O, wt %	8.34 (20 C)	ca 11.7	

* Dihydrate, also called ortho-oxalic acid, $(\text{HO})_3\text{C}-\text{C}(\text{OH})_3$, is crystallized from water.
 **Dihydrate decomposition and sublimation of oxalic acid begins at about 100 C. Above 157 C decomposition of oxalic acid becomes significant.

Appearance & odor: White, odorless, crystalline, hygroscopic (when anhydrous) solid.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits in Air	LOWER	UPPER
N/A - Solid	N/A	N/A	--	--

This material is decomposed on heating into CO₂ and formic acid; the latter, a toxic, combustible material, will further decompose to produce carbon monoxide. Fire fighters should use self-contained breathing apparatus for respiratory protection against vapors of oxalic acid and its decomposition products.

SECTION V. REACTIVITY DATA

This material and its dihydrate are stable at room temperature. When heated it can decompose to CO, CO₂, H₂O and formic acid. It reacts with concentrated sulfuric acid to give CO, CO₂, and H₂O.
 Oxalic acid is a slightly stronger acid than phosphoric acid. It reacts vigorously with alkalis and it has been found to react explosively with chlorites and hypochlorites.
 It is a reducing agent.

GENERAL ELECTRIC

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SECTION VI. HEALTH HAZARD INFORMATION

Inhalation of dust may cause irritation to mucous membranes. Eye contact with dust or solutions will cause burning sensation, with severe burns and possible permanent damage from concentrated solutions. Ingestion of concentrated solutions will cause burns and irritation to the digestive tract. Ingestion of 5 grams has caused death with symptoms: nausea, shock, convulsions and collapse coming on within 1 hour. Skin contact may have a corrosive action, with dermatitis and possible ulceration from prolonged contact.

FIRST AID:

Inhalation - Remove victim to fresh air; rinse mouth.

Ingestion - Give 3 glasses of milk or water and induce vomiting. Obtain medical attention!

Skin contact - Wash area with soap and water.

Eye contact - Immediately irrigate with water for 15 minutes minimum! Obtain medical attention!

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

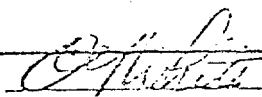
Notify safety personnel, provide adequate ventilation and avoid dusting. Use protective equipment. Carefully scoop up solid for recovery or disposal. Thoroughly neutralize liquid spills or residual solids with soda ash or sodium bicarbonate. Wash small amounts of neutralized waste down the drain with excess water.

SECTION VIII. SPECIAL PROTECTION INFORMATION

At room temperature the low vapor pressure of solid or of solutions usually requires only general room ventilation. Where dusting can occur with the solid form or when the solid or solution is heated, hood exhausts should be maintained at 100 lfm face velocity, minimum. Natural or synthetic rubber gloves should be worn to prevent skin contact. Safety glasses or goggles should be worn to prevent eye contact. Chemical shower and eye wash station should be readily available to areas of storage or use.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store in a cool, clean, dry area. Keep separate from chlorites, hypochlorites and alkalis. Prevent skin and eye contact by wearing protective equipment. Do not eat or smoke near areas of use. Always wash hands after working with oxalic acid. When a solid oxalic acid is heated or when a water solution is boiled, high atmospheric concentrations of oxalic acid can result which will require efficient exhaust ventilation to keep below the TLV.

APPROVED: 

Industrial Hygienist and
Chemical Safety Coordinator,
GE Electronics Laboratory
Syracuse, NY 13201

Judgments as to the suitability of information here are the purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, General Electric Company extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: METHYL ETHYL KETONE

OTHER DESIGNATIONS: MEK, Butanone, 2-Butanone, Ethyl Methyl Ketone, $\text{CH}_3\text{COCH}_2\text{CH}_3$,
ASTM D740, GE Material D5340, CAS# 600 078 933

MANUFACTURER: Available from many suppliers

SECTION II. INGREDIENTS AND HAZARDS

%

HAZARD DATA

Methyl Ethyl Ketone ($\text{C}_4\text{H}_8\text{O}$)

ca 100

TLV 200 ppm

Rat, oral LD₅₀
3.4 g/kgRabbit, skin LD₅₀
13 g/kg

SECTION III. PHYSICAL DATA

Boiling point, 1 atm, deg F (C)	176 (80)	Specific gravity ($\text{H}_2\text{O} = 1$)	0.806
Vapor pressure at 25°C	100 mm Hg	Volatiles, vol. %	ca 100
Vapor density (Air = 1)	2.5	Evaporation rate (Ether = 1)	2.7
Solubility in water at 20°C, wt. %	27.1	Molecular weight	72.12

Appearance & odor: Colorless liquid with a moderately sharp, fragrant, mint-like odor which is perceptible at about 25 ppm in air.

SECTION IV. FIRE AND EXPLOSION DATA

LOWER UPPER

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air		
20°F (-6.7°C) (closed cup)	960°F (516°C)	% by Vol.	1.8	10.

Extinguishing media for fires: "Alcohol" foam, CO_2 , dry chemical. Do not use a solid stream of water which can scatter flames. Use a water spray to cool metal containers exposed to fire to help avoid rupture. This volatile liquid can readily form explosive mixtures with air. The heavier than air vapors can flow to low lying or remote areas and be readily ignited by sparks or other ignition sources.

Self-contained breathing apparatus is required for those fighting fires in enclosures in which this material is involved.

SECTION V. REACTIVITY DATA

This material is stable under normal storage and use conditions, but it is a highly flammable liquid (OSHA Class IB) and must be kept away from sparks, open flames, hot surfaces, and all sources of heat and ignition. Strong oxidizing agents can cause spontaneous ignition and violent reaction.

Oxidation of MEK in air can form oxides of carbon and nitrogen.

SECTION VI. HEALTH HAZARD INFORMATION

TLV 200 ppm or 590 mg/m³

The olfactory detection level is 100 ppm. Inhalation may cause some irritation to the nose and throat. Above the TLV irritation of the mucous membranes, headache, dizziness, upset stomach, and vomiting can occur. At high concentrations MEK can produce unconsciousness, since it is a central nervous system depressant. Skin contact will defat and irritate the skin. Eye contact may cause irritation and burn sensations of the eye lid. Ingestion may cause irritation to the digestive tract; ingestion of several ounces can cause narcosis. FIRST AID:

Inhalation: Remove victim to fresh air. If required, use artificial respiration to restore breathing. Get immediate medical attention!

Skin contact: Wash area of contact with soap and water. (Clothing wetted with MEK should be immediately removed.) If irritation persists get medical attention.

Eye contact: Immediately wash with plenty of water, including under the eyelids. If irritation persists get medical attention.

Ingestion: If victim is conscious, give 3 glasses of water or milk and induce vomiting. Get medical attention as soon as possible.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel. Remove all ignition sources. Provide adequate ventilation. Absorb MEK on vermiculite or other absorbant. Scrape up with a non-sparking scoop and place in a covered metal container for disposal. Those involved in clean up should use protective equipment.

Dispose of the scrap by burning in a remote open pit or depositing in a sanitary landfill.

Liquid wastes can be atomized into an incinerator or disposed of via a licensed disposal company.

Do not dump MEK down the sewer!

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide adequate ventilation in areas of MEK use, with exhaust hoods at a minimum of 100 lfm face velocity. Exhaust fans and other electrical equipment should be explosion proof construction. Use an approved organic vapor canister gas mask for emergency and non-routine work in areas with MEK concentration below 3000 ppm; above 3000 ppm (or for unknown concentration) use an approved self-contained or air-supplied respirator.

Safety goggles are required where contact of liquid with the eyes can occur. Do not use contact lenses when working with solvents. Where splashing may occur, face shields and protective aprons should be worn. Rubber gloves (butyl or neoprene) should be worn to prevent skin contact with MEK. Immediately remove solvent-wet clothing, and completely remove MEK from clothing before reuse.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Use with adequate ventilation. Remove all ignition sources in area of use. No smoking! Ground and electrically interconnect metal containers when dispensing solvent. Use only non-sparking tools near the solvent.

Store in tightly closed drums or metal safety cans in a cool, well-ventilated storage area away from ignition sources and strong oxidizing agents. Storage facility must be of the OSHA approved type.

Information herein has been compared with a proposed OSHA Standard for methyl ethyl ketone (Federal Register, Vol 40, No 90, pp 20206-10, May 8, 1975.)

DOT Classification - FLAMMABLE LIQUID

Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, General Electric Company extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.

APPROVED: *[Signature]*
Industrial Hygienist and
Chemical Safety Coordinator,
GE Electronics Laboratory
Syracuse, NY 13201

GENERAL ELECTRIC

MATERIAL SAFETY DATA SHEET

Approved For Release 2003/09/04 : CIA-RDP84B00890R000500020013-9

CORPORATE RESEARCH & DEVELOPMENT

SCHENECTADY, N. Y.

SAFETY
SERVICES
INFORMATION

NO. 354
METHYL ALCOHOL
REVISION A
Date November 1977

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: METHYL ALCOHOL

OTHER DESIGNATION: Methanol, Wood alcohol, GE Material 05351, A.C. 05157, CH3OH.
CAS# 695 561

MANUFACTURER: Available from many suppliers.

SECTION II. INGREDIENTS AND HAZARDS

Methyl Alcohol -----

%

HAZARD DATA

ca 100

TLV 200 ppm* (Skin)
or 260 mg/m³

*Current OSHA TLV; ACGIH (1977) TLV adds (skin) notation
which indicates a potential contribution to overall
exposure via absorption through the skin.

NIOSH has recommended a 10-hr TWA of 200 ppm with a
ceiling of 800 ppm (15 minute sample).

Human, oral LDLo
340 mg/kg

SECTION III. PHYSICAL DATA

Boiling point at 1 atm, deg C --- 64.5

Specific gravity (20°/4°C) ---- 0.791

Vapor density (Air=1) ----- 1.1

Volatiles, % ----- ca 100

Vapor pressure @ 21.2°C, mm Hg - 100

Evaporation rate (CCl₄=1) ----- 1

Water solubility ---- Totally miscible

Molecular weight ----- 32.04

Appearance & Odor: A clear, colorless liquid with a characteristic alcohol odor
which is detectable at 50 to 100 ppm and above in air.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air
52°F (11 C) (closed cup)	867°F (465°C)	% by Volume

LOWER

UPPER

6

36.5

Extinguishing media: CO₂, dry chemical, alcohol foam, and water mist or fog.

Methyl alcohol fires are Class B fires, use a blanketing effect to smother fire.
It is a moderate explosion hazard and dangerous fire hazard when exposed to heat,
sparks or flames and can react vigorously with oxidizing agents.

Firefighters should use self-contained breathing apparatus with full facepiece and
full protective clothing where this material is involved in a fire in an enclosed
place.

SECTION V. REACTIVITY DATA

Methyl alcohol is a flammable material, but it is stable under normal storage and
use conditions. It does not undergo hazardous polymerization.

Avoid contact with strong oxidizing agents such as nitrates, perchlorates or
sulfuric acid.

Oxidation products in air include oxides of carbon and nitrogen.

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SECTION VI. HEALTH HAZARD INFORMATION

TLV 200 ppm (Skin) or 260 mg/m³

Methanol is a poisonous, narcotic chemical that may exert its effects through inhalation, skin absorption or ingestion. Body elimination of methanol is slow, and the toxic effects can be compounded by repeated excessive exposures over several days. Toxic effects are exerted upon the nervous system, especially the optic nerve. Ingestion can produce blindness. Symptoms of overexposure include dizziness, blurring of vision, nausea, depression, muscular incoordination and narcosis. Solvent action on any type of skin and cause dermatitis.

FIRST AID:

Inhalation: Remove victim to fresh air and prevent further exposure for 1 day.

Obtain medical assistance if victim is not returning to normal within 10 minutes.

Skin Contact: Wash affected area with soap and water; apply skin lotions.

Eye Contact: Irrigate with running water for 15 minutes. Get medical help.

Ingestion: Drink 3 glasses milk, water or 4% sodium bicarbonate. Obtain immediate medical aid for gastric lavage. (NIOSH recommends inducing vomiting if victim is conscious).

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel. Remove all sources of ignition; provide adequate ventilation. Absorb on vermiculite, paper or other absorbent. Burn in an approved incinerator or open pit away from buildings and people.

Dispose of large quantities of waste via a licensed waste solvent disposal company, or reclaim via filtration and distillation procedures. It can be incinerated.

Spills in sensitive areas may be diluted and flushed to ground with a water spray. Do not flush to sewer. Follow Federal, State and local regulations.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide adequate ventilation to meet TLV requirements. Exhaust ventilation with 100 fpm minimum should be used where vapor exposure is likely.

Prevent skin contact by wearing rubber gloves. Protective aprons, boots and face shields should be used where splashing may occur. Use safety glasses in other areas of use. Remove methanol contaminated clothing promptly.

Eye wash stations and safety showers should be available in areas of use. Exhaust fans should be explosion proof.

No smoking in areas of use.

Respirator protection for emergency:

Use air-supplied or self-contained respirators above TLV. A full facepiece is required above 2000 ppm.

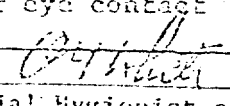
SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Prevent skin contact! Do not breathe vapors! This material is poisonous when introduced into the body metabolism. Do not ingest!

Store in a well-ventilated, fire proof area. Ground and electrically interconnect containers for transfer. Use spark-proof tools. Keep away from heat and ignition sources. No smoking in areas of storage or use.

NIOSH recommends preplacement medical exams for industrially exposed workers, periodic medical surveillance, and prompt eye examinations for eye contact with methanol or for any overexposure.

Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, General Electric Company extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.

APPROVED: 

Industrial Hygienist and
Chemical Safety Coordinator,
GE Electronics Laboratory
Syracuse, NY 13201

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HYGIENIC GUIDE SERIES

Acetone



(2-Propanone, Dimethylketone, Ketona propana)

CAS Registry Number: 000067641

Significant Physical Properties

Acetone is a commonly used liquid (colorless), with a sweetish odor.

Physical State	Liquid
Explosive Limits (by volume in air)	Lower 2.6%, Upper 12.8%
Flash Point	-17.8°C. (0°F.) (Klosed Cup)
	-9°C. (15°F.) (Open Cup)
Autoignition Temperature	550°C. (1040°F.)
Boiling Point	56.1°C. (133°F.)
Melting Point (Freezing Point)	Range: -93.9°C. (-137 F.) to -95.3°C. (-169 F.)
Molecular Weight	58.08
Solubility	Soluble in all proportions in water, alcohol, ether, and most organic solvents.
Specific Gravity	0.79 (20°C./20°C.)
Relative Vapor Density	2.00 (Air = 1.0)
Vapor Pressure	181.7 mm Hg (20°C., 68°F.)
	226.3 mm Hg (25°C., 77°F.)
At 25°C. and 760 mm Hg	1 ppm of vapor = 2.372 mg/m ³
	1 mg/m ³ = .42 ppm

I. Hygienic Standards

A. WORKDAY EXPOSURE CONCENTRATIONS: Recognized U. S. Occupational Health Standards for an 8-hour day time weighted average): 1,000 ppm (2,400 mg/m³).⁽¹⁾⁽²⁾ These values are based on human experience and are designed to protect against irritation of the eyes and mucous membranes.⁽³⁻⁶⁾ U.S.S.R.: 200 ppm; Czechoslovakia (1969): 350 ppm; and Japanese: 500 ppm.⁽⁵⁻⁶⁾

B. SHORT-TERM EXPOSURE CONCENTRATIONS: A.C.G.I.H. has established a Short Term Exposure Limit (STEL) of 1,250 ppm (3,000 mg/m³) for the maximal concentration to which workers can be exposed for a period up to 15 minutes continuously without suffering from

irritation.⁽¹⁾ Experimental human exposure to 9,300 ppm (22,050 mg/m³) showed that this concentration could not be tolerated for more than 5 minutes on account of pronounced throat irritation.^(3,7)

C. CEILING CONCENTRATION: No ceiling value established.

D. IMMEDIATE LETHAL CONCENTRATIONS: Probable lethal dose for man is 1 quart (500 grams), based on animal toxicity studies.

II. Toxic Properties

Acetone is classified by the Interstate Commerce Commission as a flammable liquid. Its vapors form explosive mixtures with air. Acetone has one of the lowest health hazard potentials. Its toxicity and its cumulative action are low for both acute and chronic exposures.

The Committee wishes to acknowledge the assistance of Gary P. Foster in the preparation of this Hygienic Guide.

However, prolonged inhalation of high concentrations, such as could be encountered in tanks or closed compartments or after large spills, may produce irritation of the respiratory tract, coughing, narcotic symptoms such as headache, drowsiness, incoordination and, in extreme cases, coma.⁽⁶⁾ The principal hazards to health of acetone are associated with the inhalation of the vapors at very high concentrations and with repeated and prolonged extensive skin contact.⁽⁷⁾

A. **INHALATION:** Inhalation of acetone concentrations of 300 - 500 ppm produces irritation of nose and mucous membranes.⁽¹¹⁻¹³⁾ At 1,000 ppm, a slight narcotic effect is also observable.⁽³⁾ Workers with long-term exposure to 1,000 ppm complained of chronic inflammation of the respiratory tract, stomach and duodenum and, in some cases, of dizziness and asthenia.⁽¹²⁾ At 2,000 ppm, acetone has a slight but distinct narcotic effect.⁽¹²⁾ Very high concentrations cause narcosis but no serious systemic injury.^(11,9,10) Other symptoms, depending upon quantity inhaled, may include slight fainting attacks or dizziness, dryness of the mouth and throat, nausea, uncoordinated movement or speech, laughing jags, drowsiness, and frequent urination.⁽¹¹⁾

B. **SKIN CONTACT:** Acetone is a defatting agent and upon contact causes the skin to become dry and irritated.^(11,7,8) An occasional short exposure should cause no skin irritation.⁽¹²⁾ The danger of absorption through the skin is very small and unlikely to occur in industry.⁽¹¹⁾ One case of fatal acetone poisoning was reported in a 12 year old child who wore a damp acetone dressing.⁽¹²⁾

C. **EYE CONTACT:** Contact with acetone in the eyes is moderately to extremely irritating.^(10,11) The liquid produces transient eye irritation.⁽⁹⁾ Vapor concentrations between 500 - 2,500 ppm have caused unacclimated persons to experience eye irritation. Acetone introduced into the eyes of rabbits caused moderate irritation. It was suggested that the injurious effect was caused by dehydration of the sclera which resulted in gelatinous flocculation and opacity of the sclera.⁽¹²⁾

D. **INGESTION:** Ingestion of acetone is practically nontoxic.⁽¹⁰⁾ Swallowing is not likely to occur because of its sharp and bitter taste.⁽⁷⁾ Acetone taken by mouth by humans in doses of 15 to 20 grams daily for several days produced no ill effects other than slight drowsiness.⁽¹¹⁾

III. Industrial Hygiene Practice

A. INDUSTRIAL USES AND OCCURRENCE:

Acetone is a low-cost industrial solvent and chemical intermediate that is used widely on a large scale.⁽⁷⁾ It is a fast-evaporating solvent used industrially in gums, resins, lacquers, oils, fats, colloidion, cotton, cellulose acetate and most acrylics.⁽¹⁴⁾ It is also a volatile solvent for oil and greases and is used in the degreasing and cleaning of clothing, fingernail polish, watches, vacuum tubes and other electronic parts.⁽¹²⁾ It may be encountered in the manufacture of smokeless powder and explosives; in the lacquer and varnish industry; in the plastics industry; in the manufacture of rubber; in the chemical industry, both as a solvent and as an intermediate for chloroform, ketones, iodoform, and sulfonal manufacturing; in the dyeing industry; in the leather industry in the form of a solvent for cements; in the manufacture of artificial silk and leather; as a solvent for acetylene; in the production of lubricating oils; in the photographic industry; and as a solvent in laboratories.^(5,7,8,11)

B. EVALUATION OF EXPOSURE:

1. **Sensory Recognition:** Although acetone may be detected at levels of 200 to 400 ppm on initial exposure, most workers are not aware of its odor until the concentration is in the vicinity of 1,000 ppm.⁽¹¹⁾ Human studies have shown eye, nose and throat irritation to occur between 300 - 500 ppm.^(11,5,6,10) Acetone has a sweetish odor resembling that of mint or fruit with a pungent, bitter taste.^(11,7,9)

2. Air Sampling and Analysis:

- Direct Field Methods:** NIOSH Certified chemical detector tubes provide a quick and relatively simple method for an on-the-spot evaluation.
- Laboratory Methods:** NIOSH recommends that a known volume of air be drawn through charcoal to trap the contaminant vapors present.⁽¹⁴⁾ The analyte is desorbed with carbon disulfide; the sample is separated with a gas chromatograph and analyzed with a flame ionization detector.⁽¹¹⁻¹⁵⁾ Two other analytical techniques described by Brown include: absorption in a sodium bisulfite solution and measured by iodometric titration, and collection on silica gel and

then titration with thiosulphate and starch.⁽¹⁰⁾

3. *Chained Monitoring:* None required.
4. *Personal Sampling and Analysis:* NIOSH recommends that sampling should be performed with a personal sampler pump whose flow rate can be determined accurately in situ. Samples can be collected on two sections, activated charcoal tubes at a rate of 200 cc/min, or less, with a total sample volume of 2 liters.⁽¹¹⁾ OSHA recommends a total volume of 3 liters based on research by White, et al.⁽¹²⁾ Temperature and pressure of the sampled atmosphere should be recorded, and all charcoal tube samples immediately capped with plastic caps. A blank charcoal tube and a bulk sample of the suspected compounds should be submitted for analysis with the samples.

C. HAZARDS AND THEIR RECOMMENDED CONTROL:

1. *Inhalation:* Engineering and work practice controls should be instituted to maintain the concentration of acetone below the hygienic standards. In emergencies, during operations requiring entry into tanks or closed vessels, when supplementing engineering and work practice controls or when such controls are not feasible, respiratory protective devices should be employed by workers thoroughly trained in their proper use and limitations.^(13,14) Where respirators are needed, only those approved by either the Mining Enforcement and Safety Administration (MESA) or the National Institute for Occupational Safety and Health (NIOSH), under provisions of 30 Part II should be used. A complete respirator selection guide for protection against acetone has been prepared.⁽¹⁵⁾
2. *Skin Contact:* Where splashes or skin contact cannot be avoided by process design and employee training, impervious skin protection should be provided.⁽¹⁶⁾ Personnel engaged in routine handling of acetone should wear rubber gloves and rubber aprons.⁽¹⁷⁾
3. *Eye Contact:* Cup-type or rubber frame goggles, equipped with approved impact resistant glass or plastic lenses, should be worn whenever there is a possibility of eye contact. Safety glasses are often used where continuous eye protection is desirable, but do not give protection

from splashes. Full length plastic shields may be used where complete face protection is desirable.⁽¹⁸⁾

Ingestion: Not applicable.

Acetone is a highly flammable liquid with a flash point of -17.8°C (-1°F). It is a colorless, volatile liquid with a characteristic odor. It is miscible with water and many organic solvents. Acetone is a powerful solvent and can cause severe skin irritation and burns. It is also a central nervous system depressant and can cause dizziness, headache, and nausea. Acetone is highly flammable and can form explosive mixtures with air. The acetone must be considerably diluted if the flash point is to be brought to a relatively safe level.⁽¹⁹⁾ Carbon dioxide or dry chemical is considered most effective for extinguishing fires. Water spray can also be used, but water in a straight hose stream should not be used, as this tends to scatter the liquid and spread the fire. The water also must be applied at a rate sufficient to dilute the mixture below the point at which it will burn. Automatic sprinklers and hose lines with spray nozzles are recommended for general fire control. Larger spills or tank fires are best controlled with "alcohol type" foam.^(14,20)

IV. Medical Information

A. FIRST AID PROCEDURES:

1. *Inhalation:* In case of exposure to high concentrations resulting in narcotic symptoms, remove the patient to an uncontaminated atmosphere at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible.^(13,21)
2. *Skin Contact:* Affected areas of the skin should be immediately washed using soap or mild detergent and water. If clothing is wetted, remove immediately and wash the skin.^(16,22)
3. *Eye Contact:* In case of any eye contact with the liquid, flush eye immediately with copious amounts of water for 15 minutes, lifting the lower and upper lids occasionally, and refer to a physician. Contact lenses should not be worn when working with this chemical.^(13,23)
4. *Ingestion:* If swallowed and the person is conscious, vomiting should be induced. Get medical attention immediately.^(13,24)

B. MEDICAL MANAGEMENT: No specific treatment.

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Howard E. Runion, Chairman; Bruce S. Horvath, Vice Chairman; Onel M. Banks, Ph.D.; Lial W. Brewer; Paul E. Caplan; William D. Christensen; Critz E. Cullen; Richard D. Fulwiler, Sc.D.; M. David Gidley; Charles E. Holdsworth, Jr., Ph.D.; William C. Jones; Marc Y. Longley, Ph.D.; Frank L. Mitchel, D. O.; Jeffry A. Pattison; Michael L. Sanders; William E. Shoemaker; Henry J. Trochimowicz, Sc.D.; Eugene G. Wood; Usha Wright

PRODUCT NAME: METHYL METHACRYLATE

CHEMICAL NAME: Methacrylic Acid

CHEMICAL FAMILY: Monomers (Acrylics)

FORMULA: $\text{CH}_2=\text{C}(\text{CH}_3)\text{COOCH}_3$

MOLECULAR WEIGHT: 100.11

SYNONYMS: Methyl Ester

I. PHYSICAL DATA

BOILING POINT (mm. Hg)	100.0 °C. (212.2 °F.)	FREEZING POINT	-17.5 °C.
SPECIFIC GRAVITY (H ₂ O = 1)	0.945 at 20/20 °C.	VAPOR PRESSURE AT 20 °C.	35 mm. Hg
VAPOR DENSITY (H ₂ = 1)	3.6	SOLUBILITY IN WATER, % by wt.	1.5
PER CENT VOLATILES BY VOLUME	100	EVAPORATION RATE (Butyl Acetate = 1)	3.1
APPEARANCE AND ODOR	Water-white liquid; pungent ester odor.		

II. HAZARDOUS INGREDIENTS

MATERIAL	%	TLV (Units)
Methyl Methacrylate	~100	100 ppm.
(See Sections III through VIII)		

III. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT [test method(s)]	66 °F., Tag open cup ASTM D 1310 57 °F., Tag closed cup ASTM D 56	AUTOIGNITION TEMPERATURE	790 °F. ASTM D 286	
FLAMMABLE LIMITS IN AIR, % by volume	LOWER	2.1	UPPER	12.5
EXTINGUISHING MEDIA	Use carbon dioxide or dry chemical for small fires. Use alcohol foam or water fog for large fires.			
SPECIAL FIRE FIGHTING PROCEDURES	Self-contained breathing apparatus and protective clothing should be worn; avoid contact with liquid and vapors.			
UNUSUAL FIRE AND EXPLOSION HAZARDS	Exposure to heat from a fire could cause violent polymerization to occur.			

EMERGENCY PHONE NUMBER

304/744-3487

This number is available days, nights, weekends, and holidays.

While Union Carbide Corporation believes that the data contained herein are factual and the opinions expressed are those of qualified experts regarding the results of the tests conducted, the data are not to be taken as a warranty or representation for which Union Carbide Corporation assumes legal responsibility. They are offered solely for your consideration, investigation, and verification. Any use of these data and information must be determined by the user to be in accordance with applicable Federal, State, and local laws and regulations.

IV. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE Approved For Release 2003/09/04 : CIA-RDP84B00890R000500020013-9
100 ppm. ACGIH (1976) OSHA CFR 29 § 1000 Table G1

EFFECTS OF OVEREXPOSURE

Irritation of eyes, nose, and throat. Nausea and vomiting.
Liquid may cause skin irritation.

EMERGENCY AND FIRST AID PROCEDURES

If inhaled, remove to fresh air. Get medical care if discomfort persists.
Flush skin and eye contact with plenty of water. Remove contaminated clothing.

V. REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID	Avoid heat, sparks, and fires.
UNSTABLE	STABLE		
---	✓		
INCOMPATIBILITY (materials to avoid)		Avoid polymerization catalysts (below), nitric acid and other strong oxidizers, ammonia and amines, halogens and halogen compounds.	
HAZARDOUS DECOMPOSITION PRODUCTS		Burning can produce carbon monoxide and/or carbon dioxide.	
HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID	Must be inhibited during shipment and storage; see Section VIII. Avoid polymerization catalysts (such as peroxides, persulfates) and high temperatures.
May Occur	Will not Occur		
✓	---		

VI. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Eliminate all sources of ignition.
Wear suitable protective equipment.
Collect, in a flammable waste container, for disposal.
Toxic to fish; avoid discharge to natural waters.

WASTE DISPOSAL METHOD

Dilute with a suitable solvent and incinerate in a furnace where permitted under appropriate Federal, State, and local regulations.

RY PROTECTION
(Specify type)

Approved For Release 2003/09/04 : CIA-RDP84B00890R000500020013-9
Air-supplied mask in confined areas

RELATION	LOCAL EXHAUST	Preferable	SPECIAL	--
	MECHANICAL (general)	✓	OTHER	--
PROTECTIVE GLOVES		Plastic gloves	EYE PROTECTION	Monogoggles
OTHER PROTECTIVE EQUIPMENT		Safety shower and eye bath		

VIII. SPECIAL PRECAUTIONS

PRECAUTIONARY LABELING

WARNING:

METHYL METHACRYLATE

**FLAMMABLE
CAUSES IRRITATION**

Keep away from heat, sparks, and open flame.
Avoid contact with eyes, skin, and clothing.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.

FIRST AID:

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. For eyes, call a physician. Wash clothing before reuse.

FOR INDUSTRY USE ONLY

OTHER HANDLING AND STORAGE CONDITIONS

INHIBITORS

This product is usually inhibited with HQ (hydroquinone) or MMHQ (monomethyl ether of hydroquinone). The inhibitor concentration should be checked at intervals and additional inhibitor added, if needed. Do not store this product under pure nitrogen or sparge it with nitrogen or other oxygen-free gas. Some dissolved oxygen should be present in the liquid for the inhibitor to be effective.

WASTE DISPOSAL

This product is toxic to aquatic life and may impart taste to drinking water supplies. It should not be discharged to natural waters nor disposed of in a landfill. Incineration is the preferred method of disposal. It is suggested that the waste material be diluted with a suitable waste solvent or supplemental fuel and incinerated. Laboratory tests indicate that, at very low concentration in water (about 10 ppm.), this product may be amenable to biooxidation in wastewater treatment facilities.

Unrecovered spilled liquid can be neutralized by careful treatment with aqueous caustic solution.

VENTILATION

Acrylates have an objectionable odor that can be detected at low concentration in air (about 0.1-0.3 ppm. in air for methyl methacrylate). Vapors must be confined as much as possible and special ventilation will probably be needed to remove any vapors that do escape.

Hydrogen Chloride

I. Hygienic Standards

A. RECOMMENDED MAXIMUM ATMOSPHERIC CONCENTRATION (8 hours): 5 parts per million parts of air, by volume (ppm).¹

(1) *Basis for Recommendation:* Sensory response.²

B. SEVERITY OF HAZARDS:

(1) *Health:* Moderate, for acute exposure; low, for chronic. The effects are primarily irritation of upper respiratory passages. Higher concentrations result in eye irritation, and fatal lung injury has been reported from single massive exposures.⁴ Erosion of the teeth may occur in persons who work regularly in atmospheres containing hydrogen chloride.

(2) *Fire:* None.

C. SHORT EXPOSURE TOLERANCE: 50 parts per million parts of air.³

D. ATMOSPHERIC CONCENTRATION IMMEDIATELY HAZARDOUS TO LIFE: 1000 to 2000 parts per million parts of air.³

II. Significant Properties

Hydrogen chloride is a gas, highly irritating to the nose and throat.

Chemical formula: HCl
Molecular weight: 36.5
Boiling point: -83.7° C
Relative vapor density: 1.26 (air = 1)
Solubility: Water: 82.3 gm per 100 ml of water at 0° C

At 25° C and 760 mm Hg,

1 ppm of gas: 0.00149 mg/liter
1 mg/liter of gas: 670 ppm

III. Industrial Hygiene Practice

A. RECOGNITION:

(1) Used chiefly as a water solution (hydrochloric acid) containing 38% or less of hydrogen chloride.

(2) By its irritant action on the respiratory passages.

B. EVALUATION OF EXPOSURES:

(1) *Instrumentation:* Collection in water and measurement of electrical conductivity.

(2) *Chemical:* Collection in water or alkaline solution, and determination of either the acid or the chloride content by acidimetry or titration, respectively. Nephelometry, using silver nitrate, may also be used.²

C. RECOMMENDED CONTROL MEASURES:

Maintain workroom atmosphere below 5 parts per million parts of air or concentration which causes significant irritation. Protect skin and eyes from contact.

IV. Specific Procedures

A. FIRST AID: If hydrochloric acid is spilled on the skin, the affected part should be immediately flushed with clean water. Eyes, if affected, should be irrigated for at least 15 minutes.

B. SPECIAL MEDICAL PROCEDURES: None.

V. Literature References

1. American Conference of Governmental Industrial Hygienists: *AMA Arch. Ind. Health*, 16: 261 (1957).
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Because of space limitations, it is impossible to list all methods of exposure evaluation. The selections have been made on the basis of current usage, reliability, and applicability to the usual industrial type of exposure. Any specific evaluation and/or control problem will involve professional judgment. This can best be done by professional industrial hygiene personnel.

Respiratory protective devices are commercially available. These devices should be confined to emergency or intermittent exposures and not relied upon as primary means of hazard control.

A relative scale is used for listing the severity of hazards. The scale is as follows: 1, low hazard; 2, moderate hazard; 3, high hazard; 4, very high hazard.

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FIAL COMM 8*235-4085

INFORMATION

Date December 1973

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: 1,4-DIOXANE

OTHER DESIGNATIONS: Dioxane, p-Dioxane, 1,4-(ethylene oxide), Diethylene Dioxide, $C_4H_8O_2$, GE Material D5B33, CAS# 000 123 911

MANUFACTURER: Available from several suppliers, including Union Carbide Corp., Chemicals & Plastics Div., 270 Park Ave., New York, NY 10017

SECTION II. INGREDIENTS AND HAZARDS

	%	HAZARD DATA
1,4-Dioxane*	> 99	8-hr TWA 50 ppm** (skin) or 180 mg/m ³ Rat, oral LD ₅₀ 6 to 7.1 g/kg Rat, oral TDLo 416 g/kg over 57 wks in drinking water (cancer) Rabbit, skin LD ₅₀ 7600 mg/kg

*May contain inhibitor to retard peroxide formation.

**ACGIH (1978) value. OSHA TLV is 100 ppm. NIOSH (1977) proposed a 1 ppm (3.6 mg/m³) limit (sampled over 30 minutes); based on animal testing, NIOSH proposed that dioxane be labeled as a suspected human carcinogen. (skin) Notation indicates that absorption through the skin can contribute significantly to overall exposure.

SECTION III. PHYSICAL DATA

Boiling point at 1 atm, deg C	101.3	Specific gravity, 20/4 C	1.03
Vapor pressure at 20 C, mm Hg	27	Volatiles, %	ca 100
Vapor density (Air=1)	3	Evaporation rate (BuAc=1)	2.7
Solubility in water at 20 C	Complete	Melting point, deg C	11.8
		Molecular weight	88.1

Appearance & Odor: A clear, colorless liquid with a faint ethereal odor, whose recognition threshold (100% of test panel) is 5.7 ppm in air.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air	LOWER	UPPER
54 F (closed cup)	356 F	Vol. % at 25 C	2.0	22

Extinguishing Media: Dry chemical or CO₂, small fire; "alcohol" foam for large fires. A water spray may be ineffective in extinguishing fire but should be used to cool fire-exposed containers and to dilute and disperse vapors and liquid that has not ignited.

This volatile, highly flammable liquid (OSHA Class IB) is a dangerous fire hazard and a moderate explosion hazard when exposed to heat and flame. Dense vapors may travel along a surface to a distant ignition source and then flash back.

Firefighters must wear full protective gear and use self-contained breathing apparatus.

SECTION V. REACTIVITY DATA

This material is stable in closed containers under nitrogen at room temperature. Anhydrous dioxane will slowly react with oxygen from the atmosphere to form explosive peroxides. If these are concentrated by evaporation or distillation of dioxane, a serious risk of explosion will exist. Exposure to sunlight will accelerate peroxide formation. Inhibitors are added to greatly reduce the rate of peroxide formation. Precautions should be taken to decompose peroxide before distilling dioxane.

Dioxane can react explosively with hydrogen in the presence of Raney nickel above 210 C. This highly flammable material is incompatible with oxidizing agents. Thermal-oxidative degradation can produce carbon monoxide.

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Dioxane is highly toxic by inhalation. It produces systemic effects when exposure is excessive. Symptoms can include irritation, headache, dizziness, drowsiness and nausea. It can damage the kidneys and liver and cause central nervous system depression. Chronic exposure to above-TLV, low concentrations has produced human fatalities, affecting chiefly the kidneys and liver. Acute exposure at 300 ppm is expected to be irritating to the upper respiratory tract within 15 minutes but irritation may later subside. Prolonged skin contact with liquid is defatting and will result in irritation and dermatitis. Dioxane can penetrate the skin without any irritation warning. Eye contact with liquid or concentrated vapors is irritating and can be damaging.

FIRST AID:

Eye and Skin Contact: Immediately flush eyes or the skin contact area with running water for at least 15 minutes, including under eyelids. Remove contaminated clothing promptly, under a safety shower for gross contamination. Contact physician.

Inhalation: Remove to fresh air. Contact physician for observation and treatment.

Ingestion: If conscious, immediately give 2-3 glasses of milk or water to drink and induce vomiting. Contact physician!

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Plans must be made in advance to handle emergency situations at a workplace. Notify safety personnel if a large spill occurs. Provide maximum explosion-proof ventilation. Remove all ignition sources and incompatible materials.

Those involved in clean up must wear full protective gear (see Sect. VIII). Small amounts and residues can be absorbed on paper or rags and allowed to evaporate in a hood; then burn the absorbing material. Material spilled in a sensitive location (possible fire) can be diluted and flushed to ground (not to sewer!) with a water spray. When feasible, contain and collect liquid or absorb on absorbent solid, such as vermiculite. Pick up using non-sparking tools and equipment for disposal.

DISPOSAL: Scrap material can be burned in an approved incinerator or disposed of via a licensed waste disposal company. Label waste properly. Follow Federal, State, and local regulations.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide general ventilation and local exhaust ventilation to meet TLV requirements. All systems used must be of explosion-proof design. Exhaust hoods should have 100 lfm minimum face velocity. Use ventilation to prevent accumulation of the dense vapors in low lying areas or sumps. Use approved respirators for nonroutine and emergency needs above the TLV. (NIOSH recommends air-supplied or self-contained respirators).

Use impervious rubber gloves and protective clothing (apron, boots, etc.) as required to prevent skin contact with dioxane. Use chemical goggles, safety glasses with side shields, face shield to protect the eyes as required. Both an eyewash station and a safety shower must be readily available to use or handling areas.

Provide preemployment medical exam and medical surveillance of workers exposed to dioxane with special emphasis on nervous system, kidneys and liver. Preclude from exposure those with disorders in these body functions.

Provide detailed safety and health training to workers involved with dioxane.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store in tightly closed containers (preferably under nitrogen atmosphere) in a cool, well-ventilated area that meets requirements for an OSHA IB flammable liquid. Keep away from sources of heat or ignition, direct sunlight, and oxidizing agents. Open containers with caution to relieve pressure. Use non-sparking tools and electrically bond and ground metal containers for liquid transfers to avoid static sparks. No smoking in areas of storage or use.

Control inventory; avoid prolonged storage to reduce hazard of peroxide generation. Measure peroxide content of dioxane before distilling or evaporating.

Based on animal testing, NIOSH has recommended that dioxane be handled as a suspected human carcinogen. Use due caution with this material. Avoid contact with liquid and inhalation of vapors. Follow good personal hygiene practice.

DATA SOURCE(S) CODE: 1-9, 12, 16, 19, 21, 23

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APPROVALS: MIS, CRD

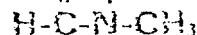
Industrial Hygiene
and Safety

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Staff

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HYGIENIC GUIDE SERIES

DIMETHYLFORMAMIDE (DMF)



CAS Registry No.: 68-12-2

Significant Physical Properties

Dimethylformamide is a colorless mobile liquid.

Molecular weight	73.09
Melting point	-61°C
Boiling point	153°C
Vapor pressure	3.7 mm at 25°C
Solubility	In water and common organic solvents
Conc. in air at saturation	4870 ppm (14,610 mg/m ³) at 25°C, 760 mm Hg
Specific gravity	0.9445 (25°/4°C)
Flash point	Closed cup 57.7°C - Open cup 67°C (153°F)
Conversion factors	1 mg/m ³ = .335 ppm 1 ppm = 3 mg/m ³

I. Hygienic Standards

A. WORKDAY EXPOSURE CONCENTRATIONS: Time-weighted average concentrations —

10 ppm (30 mg/m ³), Skin	OSHA ⁽¹⁾ , ACGIH ⁽²⁾ , Czechoslovakia ⁽³⁾
3 ppm (9 mg/m ³)	USSR ⁽⁴⁾
20 ppm (60 mg/m ³)	West Germany ⁽⁵⁾

B. SHORT-TERM EXPOSURE CONCENTRATION (15 MINUTES): 20 ppm - ACGIH tentative value⁽²⁾

C. CEILING CONCENTRATION: None given.

D. IMMEDIATE LETHAL CONCENTRATION: Unknown.

II. Toxic Properties

Dimethylformamide is a liver toxin. Even if vapor exposure is kept within the Threshold Limit Value, skin contact with the liquid or with high vapor concentrations may cause systemic

injury. Symptoms of poisoning include nausea, vomiting, and colic.

A. INHALATION: toxicity hazard low on acute exposure⁽⁶⁾ —

5,000 ppm for 6 hr. (rats)	Approximate Lethal Concentration
6,500 ppm for 4 hr. (rats)	Nonlethal

Repeated exposures at low levels may cause liver damage. Rats exposed to 91 ppm, 6 hr./day for 10 days had slightly enlarged livers; however, rabbits and cats given daily 6 hr. exposures to 300 ppm for 10 months showed no liver injury.⁽⁶⁾

B. SKIN CONTACT: Causes moderate skin irritation⁽⁹⁾ but no sensitization.⁽¹¹⁾ Repeated contact may cause skin absorption sufficient to produce liver injury⁽⁹⁾.

C. EYE CONTACT: Moderate irritant⁽⁹⁾

The Committee wishes to acknowledge the assistance of W.L. Sprout in the preparation of this Hygienic Guide.

D. INGESTION: Toxicity hazard slight on acute exposure —

4,200 mg/kg
3,750 mg/kg

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LD₅₀ mice

III. Industrial Hygiene Practice

A. INDUSTRIAL USES AND OCCURRENCE

Dimethylformamide is a polar organic solvent which is widely used in the production of synthetic fibers and films, as well as adhesives and coatings. It dissolves vinyl polymers, urethanes, epoxy resins, cellulose, urea-formaldehyde resins, polyacrylonitrile, polyamides, and polythiopolymeres.

B. EVALUATION OF EXPOSURE

1. *Sensory recognition:* The odor of DMF is not strong enough or distinctive enough to serve as a warning of overexposure. A faint fish-like odor of the free amine hydrolysis product is often present in the vicinity of a large-scale use of DMF. Early symptoms of overexposure include stomach-ache or colic, nausea, loss of appetite, vomiting and headache. Severe exposures may produce jaundice.

Prolonged contact with the skin will produce severe defatting with initial dryness and scaling, followed in 12-24 hours by loss of tissue fluid and a puckered, shrunken, whitened appearance. These changes are reversible if the skin oils are allowed to reaccumulate and normal skin permeability returns. Use of dimethylformamide to remove other substances from the skin should be prohibited and safer solvents recommended.

2. *Air Sampling and Analysis:* DMF in air can be collected by adsorption on conditioned charcoal by passing air at a measured flow rate through a tube containing the charcoal. The DMF is then desorbed with acetone and determined by gas chromatography. It may also be collected in 10 ml of water in a midjet impinger, using an air flow rate of 1.5 to 2.0 liters per minute. The aqueous solution is then analyzed by gas chromatography.⁽¹¹⁾ Sensitivity may be increased by using a nitrogen-phosphorus detector instead of flame ionization. The limit of detection using the gas chromatograph/mass spectrometer combination is approximately 10 ppb.⁽¹²⁾ An infrared gas analyzer may be used for area monitoring but is subject to interference from high humidity, components of exhaled air, ethanol, and other

gases and vapors which absorb infrared light at the selected wavelength.

metabolite of DMF in the body, whether the portal of entry is the skin or respiratory tract, is monomethylformamide (MMF).⁽¹³⁾ Worker exposure may be monitored by analyzing urine for MMF by direct injection into the gas chromatograph of an aliquot of specimen. Sensitivity may be increased by using a dichloromethane extract of the urine residue.⁽¹⁴⁾ An eight-hour exposure to air containing 10 ppm DMF vapor, without additional skin contact, in persons working at a moderate level of activity will produce a range of values centering about 20 ppm MMF in a large number of spot urine samples collected at the end of exposure periods.

C. HAZARDS AND THEIR RECOMMENDED CONTROL

1. *Inhalation:* Engineering controls (enclosure, ventilation, etc.) should be used to keep the concentration of DMF in the worker's breathing zone as low as feasible. Where concentrations exceed the exposure limit and engineering controls are not feasible, the worker should be provided with, and instructed in, the proper use and limitations of selected respiratory protection.
2. *Skin Contact:* DMF readily penetrates the skin following liquid or vapor contact. When vapor concentrations are substantially in excess of the TLV, respiratory protection alone is inadequate and an air-supplied impervious suit is required. Skin contact with liquid DMF must be avoided. Butyl rubber gloves are preferable, although Neoprene will give adequate short-term protection. For protection against splashing liquid, butyl apron and sleeves and chemical safety goggles or face shield should be used. DMF spilled on a walking surface should be washed away with water by workers wearing impervious rubbers or boots. Any areas of skin contact with DMF should be washed immediately and thoroughly with water. Contaminated clothing must be removed immediately and can be reused after laundering. Contaminated shoes must be discarded.

irrigation of the eye for at least 15 minutes with large amounts of water. A physician should be notified and his advice obtained in all cases of eye contact.

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4. **Ingestion:** Oral toxicity is slight; accidental ingestion of small amounts of DMF is best treated by diluting with large amounts of water or milk. A slurry of activated charcoal may be given.

5. **Other Important Hazards:** DMF may react with halogenated hydrocarbons in the presence of iron at high temperatures. Mixtures of DMF with nitrates, nitric acid, and chromic acid may react violently. Magnesium nitrate in DMF may decompose spontaneously. Copper and its alloys should not be used for DMF containers or process equipment. Polymeric containers should be limited to polyethylene and high-molecular-weight polyvinyl alcohol. Pump packings may be white asbestos or tetrafluoroethylene, or combinations thereof. DMF and aluminum triethyl form an explosive mixture when heated together.

Following exposures to DMF exceeding the TLV, ingestion of alcoholic beverages may produce flushing or reddening of the skin of the face and neck, sometimes extending to the remainder of the upper half of the body. This reaction is transitory and harmless and will subside within a matter of hours without treatment, but it serves as an indication that DMF exposure has not been adequately controlled.

In pregnant rats which were dosed with near-lethal amounts of DMF, an excess number of fetal deaths over those occurring in undosed controls were counted. It is important to prevent excessive absorption in female workers of child-bearing potential. In particular, facilities should be available to permit thorough washing of the skin and changing of any contaminated clothing in the event of accidental skin contact. It is unlikely that inhalation of air concentrations near the TLV would produce an embryotoxic level. DMF has not been demonstrated to have a teratogenic or carcinogenic effect. It is negative in the mutagenic screen with *Salmonella typhimurium*.⁽¹³⁾

be initiated following any contact with DMF. Workers exposed to excessive air should be kept at rest, and given artificial respiration if necessary. A physician should be summoned in all cases where exposure has been heavy or symptoms persist.

- B. **MEDICAL MANAGEMENT:** Supportive therapy and observation have been adequate for the care of all acute exposures to DMF reported at this time.

Progress of the case can be documented by following the excretion of DMF in the exhaled air, urine, or both.

V. References

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2. American Conference of Governmental Industrial Hygienists: *Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment with Intended Changes for 1977*. Cincinnati, Ohio (1977).
3. Czechoslovak Committee of MAC: *Documentation of MAC in Czechoslovakia*. (1969).
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Howard E. Rumion, Chairman; Onoff M. Bantz, Ph.D.; Lisa W. Brewer; Paul E. Caplan; William D. Christensen; Emil E. Christofano; Fritz E. Cullen; Richard D. Fulwiler, Sc.D.; David Gidley; Charles E. Hollasworth, Ph.D.; Bruce S. Horvath; William C. Jones; Mary Y. Longley, Ph.D.; Frank L. Mitchell, D.O.; John D. Nefusa, Ph.D.; Jeffrey Patterson; William E. Shoemaker; H.J. Trochimowicz, Sc.D.; Eugene G. Wood; Usher Wright.

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CORPORATE RESEARCH & DEVELOPMENT

SCHENECTADY, N. Y. 12305

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No. 316

BENZENE

Revision C

Date November 1973

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: BENZENE

OTHER DESIGNATIONS: Benzol, Phenylhydride, Phenol, C₆H₆, GE Material D3363, ASTM D835, D336, D4359, CAS #000 071 432

MANUFACTURER: Available from many sources.

SECTION II. INGREDIENTS AND HAZARDS

	%	HAZARD DATA
Benzene	ca 100	3-hr TWA 10 ppm (skin)* with 25 ppm ceiling level and 50 ppm 10 minute peak
<p>*Current OSHA and ACGIH (1978) permissible exposure level. Note that the OSHA standard on benzene which would reduce the TLV to 1 ppm with a 5 ppm ceiling, forbid contact with liquid with over 0.5% benzene, and legally classify benzene as a human carcinogen has been struck down by U.S. Court of Appeals. ACGIH (1978) lists benzene as a <u>suspected carcinogen</u> for humans.</p>		

SECTION III. PHYSICAL DATA

Boiling point, 1 atm, deg F (C) -- 176 (80)	Specific gravity, 20/4 C -- 0.879
Vapor pressure at 20 C, mm Hg -- 74.6	Volatiles, % ----- ca 100
Vapor density (Air=1) ----- 2.77	Evaporation rate (CCl ₄ =1) - 1.0
Solubility in water, wt. % ----- 0.06	Molecular weight ----- 78.12
	Melting point, deg F (C) -- 42 (5.5)
<p>Appearance & Odor: Clear, colorless liquid having a characteristic aromatic odor. The odor recognition threshold (100% of panel) is 4.68 ppm (unfatigued) in air. Odor is <u>not</u> an adequate warning of hazard.</p>	

SECTION IV. FIRE AND EXPLOSION DATA

		LOWER	UPPER
Flash Point and Method	Autoignition Temp.	Flammability Limits in Air	
120°F (-11°C) (TCC)	1044°F (562°C)	Volume %	
		1.3	7.1

Extinguishing Media: Water fog, CO₂, dry chemical or foam. Use a blanketing effect to smother fire. A water stream will scatter the fire. A water spray can be used to cool fire exposed containers.

Firefighters should wear approved self-contained breathing apparatus.

This material can form explosive and flammable mixtures with air at room temperature. It is a severe explosion hazard and toxic hazard in a fire situation. Vapors can flow along surfaces to distant ignition sources and flash back.

SECTION V. REACTIVITY DATA

Benzene is a stable compound under normal storage and use conditions; it does not polymerize.

Benzene will react vigorously with strong oxidizers such as ozone, permanganate, sulfuric or nitric acids, potassium peroxide, sodium peroxide, et al. It is a flammable liquid.

Class IB. Heating greatly increases the fire and explosion hazards.

Oxidation in air will produce oxides of carbon and nitrogen.

SECTION VI. HEALTH HAZARD INFORMATION

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Excessive inhalation or prolonged skin exposure may cause headache, weariness, loss of appetite and lassitude with incipient blood effects including decreased cell counts, mild lymphotosis and eosinopenia. The most significant toxic effect of benzene is insidious and often irreversible injury to the blood forming tissue from chronic low level exposures. Development of leukemia may occur from chronic excessive exposure! Eye contact yields irritation from liquid or high vapor concentrations. Skin contact will also yield a defatting effect. Inhalation may result in collapse, bronchitis and pneumonia.

FIRST AID:

Eye contact: Wash eyes well with water for 15 minutes. Contact physician.

Skin contact: Wash skin well with water. Contaminated clothing should be removed at once.

Inhalation: Remove victim to fresh air. Restore breathing if required and administer oxygen for labored breathing. Contact physician.

Ingestion: Give edible fats or oils to swallow. Do not induce vomiting (aspiration hazard). Contact a physician immediately.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

If a significant spill occurs, notify safety personnel and evacuate the area. Remove all ignition sources. Provide maximum explosion-proof ventilation. Clean-up personnel must use approved self-contained breathing apparatus and other protective equipment to avoid contact with benzene.

Remove free liquid. Pick up residue with an inert absorbant, such as vermiculite, and placed in a closed metal container for disposal, using non-sparking tools. When necessary, benzene may be flushed away from a critical area with water, but flush to open area only, not to sewer or to surface waters.

DISPOSAL: Incinerate waste benzene or dispose of via a licensed solvent disposal company. Do not send (or allow run off) to the sewer!

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide general ventilation and local exhaust ventilation where benzene is used, handled, or stored to meet TLV requirements. Self-contained breathing apparatus should be available for emergencies and non-routine situations. Approved cartridge or canister type respirators can be used for benzene concentrations up to 50 ppm for short periods. A full facepiece is required above 10 ppm.

To prevent skin contact, gloves, aprons, boots, etc of neoprene or other benzene-resistant materials should be used. Chemical goggles or face shields should be used if splashing is possible. Eyewash station should be available where splashing is probable.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Whenever possible, less toxic solvents should be substituted for benzene. Consult health and safety services before benzene is used in plant operations. Do not breathe vapors. Prevent contact with liquid. It is a suspected cancer causing agent!

Keep away from heat, sources of ignition, and oxidizing agents. No smoking in areas of use. Store and handle as OSHA Class IB liquid.

Pre-employment detailed medical examination is needed. Workers who show heart, lung, kidney, liver, nervous disease, or any blood abnormality should not be assigned. Periodic physical examinations and area monitoring is required.

DATA SOURCE(S) CODE: 2-9, 12, 21

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APPROVALS: MIS, CRD

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MATERIAL SAFETY DATA SHEET

CORPORATION Approved For Release 2003/09/04 : CIA-RDP84B00890R000500020013-9

SCHENECTADY, N. Y.

GENERAL ELECTRIC
MATERIALS
INFORMATION

ETHYLENE GLYCOL

Revision A

Date November 1977

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: ETHYLENE GLYCOL

OTHER DESIGNATIONS: Glycol, 1,2-Ethanediol, HOCH₂CH₂OH, ASTM D2693, GE Material D5338
CAS# 000 107 211

MANUFACTURER: Available from many suppliers.

SECTION II. INGREDIENTS AND HAZARDS

Ethylene glycol

ca 100

HAZARD DATA

Vapor*

TLV 100 ppm or
260 mg/m³

Particulate*

TLV 10 mg/m³

* ACGIH (1977) TLV; no OSHA TLV established.

Human, oral LDLo
1.5 g/kg

SECTION III. PHYSICAL DATA

Boiling point, 1 atm, deg F (C) 387 (197)

Vapor pressure @ 20°C, mm Hg -- 0.06

Vapor density (Air = 1) ----- 2.1

Solubility in water @ 20°C --- Complete

Specific gravity (H₂O = 1) ----- 1.12

Evaporation rate (CCl₄ = 1) ----- 1

Refractive index at 25°C ----- 1.430

Freezing point, deg C ----- -12.7

Molecular weight ----- 62.08

Appearance & odor: Colorless, odorless, sweet-tasting liquid. (Poisonous!)

SECTION IV. FIRE AND EXPLOSION DATA

LOWER UPPER

Flash Point and Method

Autoignition Temp.

Flammability Limits In Air

232°F (TCC)

775°F

% by Vol.

3.2

15.3

Extinguishing media: CO₂, water, dry chemical or alcohol foam (especially for large fires). Cool fire-exposed containers with water. Spills may be flushed and diluted with water to reduce flammability.

Ethylene glycol, when heated or misted into the air, becomes a moderate fire and explosion hazard.

SECTION V. REACTIVITY DATA

Ethylene glycol may react with oxidizing agents.

Ignition in air will generate oxides of carbon and nitrogen.

Ethylene glycol is hygroscopic.

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vapor: 100 ppm or 250 mg/m³

Inhalation of high ethylene glycol concentrations produces symptoms similar to ethyl alcohol intoxication; pulmonary edema and also death. The lethal oral dose for humans is about 3-4 ounces or about 1.4 ml/kg. Sub-lethal ingestion can produce intoxication and coma. Chronic feeding of ethylene glycol to rats - about 10% of the lethal dosage in daily diet for two years - shortened the life span and damaged kidney, bladder, and liver. Eye contact may cause discomfort. Skin contact may produce mild irritation, with some absorption through the skin possible from prolonged contact.

FIRST AID:

Inhalation: Remove victim to fresh air. Get medical attention.

Eye contact: Wash with plenty of running water for 10 minutes. Get medical attention.

Skin contact: Rinse off with water; then wash area with soap and water.

Ingestion: Give 3 glasses milk or water and induce vomiting at once! Get medical attention!

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel. Provide adequate ventilation. (Normal ventilation may be satisfactory if liquid is at room temperature and not misted into the air). Those handling spill emergencies should use proper protective equipment. Recover as much spilled material as feasible for disposal. Wash residue or small spills to the sewer with copious water. Large quantities of liquids may be disposed of by mixing with more flammable solvents and atomizing into an incinerator.

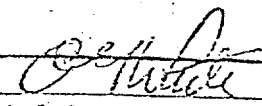
SECTION VIII. SPECIAL PROTECTION INFORMATION

When ethylene glycol is heated, or agitated, or sprayed, proper exhaust hoods with 100 face velocities should be used. Rubber gloves should be worn to prevent skin contact. Safety glasses or goggles should be worn in areas of use where splashing is possible. Eye wash stations should be available.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Do not take internally! Heated and agitated solutions should have proper exhaust ventilation of area to prevent inhalation liquid particles and vapors.

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APPROVED: 

Industrial Hygienist and
Chemical Safety Coordinator,
GE Electronics Laboratory
Syracuse, NY 13201

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Phone: (518) 535-4085

DIAL COMM 8*235-4085

Date December 19

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: PYRIDINE

OTHER DESIGNATIONS: CAS# 9, GE Material D5B52, ASTM D4323, CAS# 960 110 261

MANUFACTURER: Available from several suppliers.

SECTION II. INGREDIENTS AND HAZARDS

Pyridine

95

HAZARD DATA

8-hr TWA 5 ppm* or
15 mg/m³Rat, oral LD₅₀
891 mg/kgRat, inhalation LC
4000 ppm for 4 hr

*Current OSHA and ACGIH (1978) TLV.

SECTION III. PHYSICAL DATA

Boiling point at 1 atm, deg C ----- ca 115-116

Specific gravity, -25/4 C -- 0.97

Vapor pressure at 13.2 C, mm Hg --- 10

Volatiles, % ----- ca 10

Vapor density (Air=1) ----- 2.7

Freezing point, deg C ----- -42

Water solubility ----- Soluble

Molecular weight ----- 79.1

pH, 0.2 M solution in H₂O ----- 8.5

Appearance & Odor: A colorless to slightly yellow liquid with a characteristic, disagreeable odor with a recognition threshold of (100% of test panel) 0.021 ppm in air.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method

Autoignition Temp.

Flammability Limits In Air

LOWER

UPPER

20 C (closed cup)

482 C

Volume %

1.8

12.

Extinguishing Media: Carbon Dioxide, dry chemical or "alcohol" foam. Water may be ineffective in putting out fire but can be used to cool fire-exposed containers or to dilute and flush spills.

These heavy vapors may flow along surfaces to a distant ignition source and flash back.

It is a dangerous fire hazard when exposed to heat or flame. Vapors form explosive mixtures in air.

Firefighters should use self-contained breathing equipment with eye protection against vapors.

SECTION V. REACTIVITY DATA

Pyridine is a stable material when stored in closed containers at room temperature. It does not polymerize.

This flammable liquid (OSHA Class IB) should be kept separate from strong oxidizing agents.

Thermal-oxidative decomposition can produce toxic nitrogen-containing materials, including oxides of nitrogen, cyanides, etc.

Pyridine is a weakly basic material (pKa is 5.19); it will react exothermically with acids. Heated maleic anhydride is decomposed by pyridine with rapid gas evolution.

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Pyridine is toxic by inhalation of vapors and by ingestion. It is irritating to skin and may be absorbed through the skin. Eye contact is irritating and can be damaging. Excessive inhalation produces irritation of the respiratory tract, asthmatic breathing, headache, dizziness, nausea and central-nervous system depression. Ingestion will upset the GI tract. Systemic effects can include kidney and liver damage.

FIRST AID:

Eye contact: Flush immediately with plenty of running water, including under eye lids, for 15 minutes. Get medical help.

Skin contact: Wash contact areas well with soap and water. Remove contaminated clothing promptly.

Inhalation: Remove to fresh air.

Ingestion: Contact physician immediately for gastric lavage.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Provide maximum explosion-proof ventilation. Eliminate sources of ignition. Personnel involved in clean-up should use protection against liquid contact and vapor inhalation. Cover and absorb small spill with 9:1 mixture of sand and soda ash; pick up and place in a cardboard box with crumpled paper, scrap wood, excelsior, etc. for prompt burning.

Pyridine can be flushed away from sensitive location with a water spray.

DISPOSAL: Burn waste material (as indicated above or in flammable solvent solution) in an approved incinerator with afterburner and scrubber. (nitrogen oxides emitted). Follow Federal, State and local regulations.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide general ventilation and local exhaust ventilation to meet TLV requirements.

Approved, self-contained breathing apparatus must be available for non-routine and emergency use.

Protect skin against contact with liquid by use of butyl rubber gloves, aprons, other protective clothing as required by exposure risk. Use chemical goggles for eye protection with an eyewash station near use area. A safety shower is required where contact with large amounts of pyridine is possible.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store as a flammable (OSHA Class IB liquid), away from acids and strong oxidizing agents. Outside or detached storage considered preferable. Protect containers from physical damage. Electrically bond and ground metal containers for transfers to prevent static sparks.

Regular physical exam of exposed workers recommended. Restrict exposure of those with central nervous system, kidney, or liver disorders.

DOT Classification - FLAMMABLE LIQUID

DATA SOURCE(S) CODE: 2, 4-9, 20, 21

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APPROVALS: MIS, J.M. Wilson
CRD

Industrial Hygiene
and Safety

Corporate Medical
Staff

Long, F. Martin, MD

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SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: POTASSIUM CYANIDE

OTHER DESIGNATIONS: KCN, Potassium Salt of Hydrocyanic Acid, CAS# 000 131 503

MANUFACTURER: Available from several suppliers.

SECTION II. INGREDIENTS AND HAZARDS

	%	HAZARD DATA
Potassium Cyanide (KCN)	99.0 minimum	TLV 5 mg/m ³ (as CN) Dog LD (oral) 1.6 mg/kg Human, oral LD ₅₀ 2.86 mg/kg Rat, oral LD ₅₀ 10 mg/kg

SECTION III. PHYSICAL DATA

Melting point ----- 634°C

Specific gravity ----- 1.52

Water Solubility @ 25°C ----- 71.6g/100gH₂O

Molecular weight ----- 65.12

Appearance & odor: White, crystalline solid. Dry, no odor; moist, possible bitter almond (HCN) odor.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air	LOWER	UPPER
Non-flammable	N/A	N/A	---	---

Non-flammable material.

SECTION V. REACTIVITY DATA

KCN is stable under proper storage and use conditions. It does not polymerize. KCN will react with acid solutions to liberate toxic hydrogen cyanide gas. Keep away from oxidizing agents. Chlorates, nitrites and nitrogen trichloride have been found to form explosive mixtures (some spontaneous) when contacted with KCN.

Deliquescent. Gradually decomposed on exposure to air by reaction with CO₂ and moisture. Aqueous solutions are strongly alkaline.

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... toxic chemical in dust or solution form. Inhalation o
... mist or vapors will cause ... convulsion and unconse
ness. The lethal oral dose for adults is approximately 250 milligrams, a minute amo
Ingestion will also cause corrosion and irritation of digestive tract! Skin contact
may cause irritation and may allow absorption of toxic quantities of cyanide.

FIRST AID: Get prompt medical attention for any exposure after first aid is admini

Inhalation: Move victim to fresh air. Supply artificial respiration if needed.
amyl nitrite pearl in a cloth and hold under victim's nose for 15 se
repeat 5X after 15 second intervals. Repeat every 5 minutes with
pearl, until 3 or 4 pearls have been given.

Skin contact: Remove contaminated clothing. Wash contaminated area with soap and wa
watch for toxic symptoms. (Scratches or open wounds greatly increa
the danger of poisoning.)

Ingestion: Give one pint of 1% sodium thiosulfate and induce vomiting.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel. Provide adequate ventilation. Solid spills should be swept
and placed in closed containers. Liquid spills should be covered with a strong cal
hypochlorite solution and flushed to sewer with excess water. Do not let acidic
solutions contact spilled cyanide or mix with sewer washings as extremely toxic
hydrogen cyanide gas will form. Must be carefully controlled. In every case of wa
disposal federal, state and local regulations must be taken into consideration.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide adequate exhaust ventilation to meet TLV requirements. Hood exhaust systems
cyanide use areas should have a face velocity minimum of 100 lfm. Air over plating
tanks should be periodically monitored for cyanide levels.

Skin contact should be prevented by wearing rubber gloves and also aprons and boots w
splashing may occur. Use dry, cotton gloves when handling solid potassium cyanide.
Safety goggles should be worn in areas using cyanide solutions.

Eye wash stations should be readily available where splashing of cyanide solution is
possible.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Do not breath cyanide dust, mist or vapors. Prevent skin contact. Do not allow cont
with acid since toxic gas (HCN) will form. Administer prompt first aid in cases of
over-exposure. Contact medical personnel immediately for emergencies. Toxic cyani
vapors have a bitter almond odor.

Strong cyanide solutions are corrosive to the skin and eyes and may cause deep ulcers
which are slow to heal. No food consumption can be allowed in areas where cyanides
are used, handled, or stored.

DOT Classification - POISON B

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APPROVED: *[Signature]*

Industrial Hygienist and
Chemical Safety Coordinator
GE Electronics Laboratory
Syracuse, NY 13201

GENERAL  ELECTRIC

SCHEENECTADY, N. Y. 12305

Phone: (518) 335-4085 DIAL COMM 8*235-4085

INFORMATION

SODIUM CARBONATE,
ANHYDROUS

Date December 1973

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: SODIUM CARBONATE, ANHYDROUS *

OTHER DESIGNATIONS: Soda Ash, Na_2CO_3 , ASTM 1453, GE Material D4D5, CAS # 000 497 198

MANUFACTURER: Material available from several suppliers, including Allied Chemical Corp., Industrial Chemicals Div., Ashland Chemical Company, and BASF Wyandotte Corp., Industrial Chemicals Group.

Other forms are available: Monohydrate, $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$; Decahydrate, $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$, which is also called Sal Soda or Washing Soda.

SECTION II. INGREDIENTS AND HAZARDS

Sodium Carbonate, Anhydrous

%

HAZARD DATA

ca 99

No TLV established*

Rat, oral
LDLo 4000 mg/kg

*Control at least as a nuisance particulate: OSHA 15 mg/m^3 (total dust) or 5 mg/m^3 (respirable dust); ACGIH (1978) 10 mg/m^3 (total dust) or 5 mg/m^3 (respirable dust).

SECTION III. PHYSICAL DATA

Melting point, deg C ----- 851 Specific gravity ----- 2.53

Boiling point ----- Begins slow decomposition Molecular weight ----- 106

at 400 C pH aqueous solution ----- 11.6

Water solubility at 8 C, Wt.% ----- 7.1

Appearance & Odor: Odorless, white, hygroscopic powder or granular solid.

Note: The decahydrate begins to lose water at or below its melting point (34 C) and the monohydrate at about 50 C. Both will become anhydrous sodium carbonate when heated at 100 C.

SECTION IV. FIRE AND EXPLOSION DATA

LOWER UPPER

Flash Point and Method

Autoignition Temp.

Flammability Limits In Air

N/A

N/A

N/A

This is a noncombustible material. Use extinguishing media appropriate for the surrounding fire.

No unusual fire or explosion hazards; no special firefighting procedures.

Firefighters must wear full protective gear and use self-contained breathing apparatus with a full facepiece when this material is involved in a fire.

SECTION V. REACTIVITY DATA

This is a stable material in closed containers at room temperature. It begins to decompose slowly at 400 C on heating to give carbon dioxide and NaO.

It will react with fluorine gas at room temperature, generating incandescent temperatures.

It can produce an explosion if it contacts red-hot aluminum metal.

It is an alkaline material that is incompatible with strong acids.

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SECTION VI. HEALTH HAZARD INFORMATION

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Exposure to airborne dust or mist (from solutions) of this alkaline material can cause irritation of eyes, skin, or upper respiratory tract on contact. Excessive contact is known to have caused "soda ulcers" on hands and perforation of the nasal septum. Sensitivity reactions may occur from prolonged and repeated contact. It is only slightly toxic by ingestion, but ingestion of large amounts can be corrosive to the GI tract and produce abdominal pains, vomiting, diarrhea, and circulatory collapse. Concentrated solutions in prolonged contact with skin or eyes can destroy tissue.

FIRST AID:

Eye Contact: Promptly flush eyes with plenty of running water for 15 minutes or more including under eyelids. Consult a physician if irritation persists.

Skin Contact: Wash affected area of skin well with soap and water. Get medical help if irritation persists. Remove contaminated clothing. Launder before reuse.

Inhalation: Remove to fresh air. Consult physician for observation and treatment.

Ingestion: Contact physician promptly for gastric lavage. Give 2-3 glasses of water to drink to dilute. Do not induce vomiting.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel if spill is large. Avoid producing dusty conditions. Scoop up solid for recovery or disposal. Flush residues and liquid spills to holding area for neutralization before discharge. Those involved in clean-up should use protection against skin contact or inhalation of dust or mist.

Disposal - Follow Federal, State, and local regulations for disposal. After neutralization with, for example, dilute HCl, and further dilution, liquid wastes can usually be flushed to drain with much water.

Solid scrap can be reserved for neutralization of acidic wastes.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Use general ventilation and local exhaust ventilation to meet TLV for nuisance dust and to prevent irritating concentrations of dust or mist in the workplace. Ventilation requirements will depend on the process. An approved self-contained respirator with full facepiece is recommended for nonroutine or emergency conditions for inhalation protection. (OSHA allows use of other approved respirators.)

Use protective rubber gloves and use protective apron and other clothing as needed where splashing may occur with alkaline solutions. Use safety glasses with side shields or safety goggles. Provide an eyewash station near areas of use; a safety shower is needed where large amounts of material (especially as solutions) are handled.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store in a tightly closed container in a clean, well-ventilated place away from strong acids. Protect container from physical damage.

Avoid contact with skin and inhalation of dust or alkaline mist. Follow good hygienic practice.

DATA SOURCE(S) CODE: 1,2,4-8,12,14

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APPROVALS: MIS, *J.M. Nix*
 Industrial Hygiene and Safety *C. J. White*
 Corporate Medical Staff *George F. Martin M.D.*

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SECTION VI. **HEALTH** Approved For Release 2003/09/04 : CIA-RDP84B00890R000500020043-9

Sodium hydroxide is a strong alkali and is dangerous when improperly handled. It can be destructive to all human tissue it contacts, producing severe burns. Eye contact can produce severe or permanent injury. Dust or mist inhalation can injure the entire respiratory tract.

FIRST AID

Eye contact - Wash eyes immediately with plenty of running water for no less than 15 minutes, including under the eyelids and all surfaces. Speed in rinsing out the eyes with water after contact is extremely important if permanent injury is to be avoided. Contact physician as soon as possible.

Ingestion - Immediately dilute chemical by drinking large amounts of water or milk, then neutralize with dilute vinegar or fruit juice. Vomiting may occur spontaneously, but do not induce it. Contact a physician promptly.

Inhalation - Remove from exposure to mist or dust and get prompt medical help.

Skin contact - Wash contact area promptly with large quantities of water. (Dilute acetic acid, vinegar, can be used to neutralize.) Remove contaminated clothing under the shower. Prolong washing in serious cases until medical help arrives - even for an hour or longer. Physician should see all cases other than minor exposures to small areas of skin.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

When solid sodium hydroxide is spilled in a dry condition, it can be promptly shoveled up for recovery or disposal. (CAUTION! Avoid dusting. Avoid contact with the skin.) Control the disposal of the waste solid. (Delay in clean up may allow absorption of moisture from the atmosphere and may increase the difficulties of clean up.) Flush contaminated surfaces with water and neutralize with dilute acid, preferably acetic acid, to remove final traces. (Sodium bicarbonate may also be used to partially neutralize.) Finally, rinse with water.

Disposal of waste is greatly dependent on local conditions and requirements. Pre-emergency plans should be made to meet legal and technical requirements. Waste caustic should never be deliberately discharged directly into sewers or surface waters. (First, convert to neutral salts and dilute well with water.)

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide adequate ventilation to meet TLV requirements, especially where dusting or misting conditions can exist. Use filter-type respirator for mist and dust protection where needed.

Use chemical safety goggles! A plastic face shield can also be used.

Use rubber gloves, rubber apron or protective clothing, rubber boots where needed to prevent contact with sodium hydroxide, especially when solutions are prepared.

Eye wash fountains and safety showers must be immediately available!

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Workers should not be permitted to handle this material without proper training or to work with it without protective equipment.

Store in well-sealed containers. Avoid handling conditions that may lead to spills and leaks, or to formation of mist or dust.

Wherever this material is stored, unloaded, handled or used abundant water (preferably running water) should be available for emergency use.

Basins for storage or use areas for this material should have retention basins for pH adjustment and dilution of spills and flushings before discharge.

This material is classified as a CORROSIVE by the Department of Transportation.

The pallet form is probably the safest solid form for handling and dispensing.

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APPROVED: *COY White*

Industrial Hygienist and
Chemical Safety Coordinator,
GE Electronics Laboratory
Syracuse, NY 13201

SCHENECTADY, N. Y.

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INFORMATION

ISOPROPYL ALCOHOL

Revision B

Date November 1977

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: ISOPROPYL ALCOHOL

OTHER DESIGNATIONS: Isopropanol, (2-Propanol, isopropyl alcohol, Dimethyl Carbinol, $CH_3CH(OH)CH_3$, ASTM D-110, US Material 20497, CAS# 67-63-0

MANUFACTURER: Available from many suppliers

SECTION II. INGREDIENTS AND HAZARDS

Isopropyl Alcohol

ca 100

HAZARD DATA

TLV 400 ppm (skin)*

*NIOSH has proposed a 10-hr TWA (instead of the 8-hr TWA or TLV) of 400 ppm with a ceiling concentration of 800 ppm (15 minute sampling time).

Human, oral LDLo
2371 mg/kg

Rabbit, skin LD50
16 mg/kg

SECTION III. PHYSICAL DATA

Boiling point, 1 atm, deg F (C) -----	180 (82)	Specific gravity ($H_2O=1$) -----	0.786
Vapor pressure @ 20°C, mm Hg -----	33	% Volatile -----	ca 100
Vapor density (Air = 1) -----	2.07	Evaporation rate ($CCl_4 = 1$) --	2.6
Solubility in water -----	Completely soluble	Molecular weight -----	60.11

Appearance & odor: Clear, colorless liquid with an alcohol odor.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air	LOWER	UPPER
53°F (closed cup)	750°F (399°C)	% by Vol.	2.0	12.0

Fires involving isopropyl alcohol may be extinguished with carbon dioxide, dry chemical or foam. A fine water mist may be used to smother the fire. A moderate explosion hazard exists when this material is exposed to heat or flames. At 20°C the vapor space (saturated) above isopropyl alcohol contains about 4.3 volume % of vapor.

SECTION V. REACTIVITY DATA

This material is a flammable liquid OSHA class 1B, which is stable under normal storage and use conditions. It does not undergo hazardous polymerization.

Isopropyl alcohol should not be used or stored near areas of heat or open flames.

Strong oxidizing materials can react vigorously with this alcohol. Its vapors with hydrogen and palladium particles have caught fire when exposed to air.

Oxidation in air will generate oxides of carbon and nitrogen.

Inhalation of isopropyl alcohol at the TLV may cause the nose and throat this is generally a good warning property. Prolonged exposures above the TLV may cause narcosis, nausea and headache. Eye contact will cause local irritation and burning sensations, with possible eye damage. Skin contact will cause defatting and possible irritation from prolonged contact. Ingestion will cause burning sensations of the digestive tract. This alcohol is considered a poison, with ingestion of 10 ml causing serious illness. The single lethal oral dose for an adult is approximately 250 ml.

FIRST AID:

Inhalation: Remove victim to fresh air; observe for 30 minutes for intoxication signs. Get medical assistance for serious exposure.

Skin contact: Flush with water.

Eye contact: Irrigate with water for 15 minutes; obtain medical attention.

Ingestion: Get prompt medical attention! Induce vomiting if physician is not immediately available.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel. Remove all ignition sources. Provide adequate ventilation. This material is handled and disposed of as a flammable liquid. Absorb small spills on paper; evaporate isopropyl alcohol in an exhaust hood; burn paper after evaporation is complete. Other absorbants, such as vermiculite, can be used for larger amounts; pick up solid with a non-sparking scoop; deposit in metal container with cover; burn or evaporate in safe area.

Large quantities of waste liquid can be atomized into an incinerator, can be disposed of via a licensed solvent disposal company, or can be reclaimed.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide adequate exhaust ventilation to meet TLV requirements. Exhaust hoods should maintain a 100 lfm face velocity. Exhaust fans should have explosion-proof construction. Use plastic or rubber gloves and aprons where necessary to avoid skin contact. Safety glasses or goggles should be worn in areas where splashing may occur. Eye wash stations should be available.

NIOSH recommendations for Emergency (or non-routine) respirator use: Chemical cartridge type below 1000 ppm; canister, self-contained, or air-supplied type with full face-piece above 1000 ppm.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store in a clean, cool area away from sparks, open flames, and oxidizing agents. Small amounts should be stored in metal safety cans in OSHA approved safety cabinets or storage rooms.

Metal dispensing containers should be grounded and electrically interconnected for transfers of this material. Use non-sparking tools to work near this material. Do not smoke in areas of storage or use. Do not take internally.

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APPROVED:

[Signature]
Industrial Hygienist and
Chemical Safety Coordinator
GE Electronics Laboratory
Syracuse, NY 13201

HYGIENIC GUIDE SERIES

Sulfuric Acid



CAS No. 7664-93-9

Significant Physical Properties

Concentrated sulfuric acid is a colorless, oily liquid but dilute solutions resemble water in appearance. Fuming sulfuric acid is an oily, yellow liquid giving off sulfur trioxide at room temperature.

Common Names	100-140% H_2SO_4 is oleum (fuming sulfuric acid with 0-40% excess SO_3) 95-98% H_2SO_4 is concentrated acid 93.19% H_2SO_4 is oil of vitriol (vitriolic acid) 77.67% H_2SO_4 is tower acid ⁽¹⁾ (Glover acid)
Molecular Weight	98
Melting Point	3.0°C (98.3%)
Boiling Point	338°C (98.3%)
Vapor Pressure	1 mm Hg at 145.8°C, 15.9 mm Hg at 195°C
Solubility	Miscible with water in all proportions and with miscellaneous organic solvents
Explosive Limits	Nonflammable
Specific Gravity	1.834 (98.3%) (20°C/4°C)
Autoignition Temperature	Nonflammable ⁽²⁾
Conversion Factors	1 ppm = 4.01 mg/m ³ 1 mg/m ³ = 0.250 ppm
(25°C and 760 mm Hg)	

I. Hygienic Standards

- A. **WORKDAY EXPOSURE CONCENTRATIONS:** 1 mg/cu m of sulfuric acid mist, determined as a time-weighted average exposure for up to a 10-hour workday, 40-hour work week, is the threshold limit value (TLV) assigned by the ACGIH⁽³⁾ and accepted by OSHA.⁽⁴⁾ NIOSH recommended the same limit in 1974.⁽⁵⁾
- B. **SHORT TERM EXPOSURE LIMIT (STEL):** Eye and throat irritation occurs between 0.5 and 2 mg/cu m⁽⁶⁾, consequently, a tentative TLV-STEL of 1 mg/cu m was recommended by ACGIH in 1976 for exposures up to 15 minutes.⁽³⁾ These 15-minute exposures should occur no more

than four times a day with at least 60 minutes between each occurrence.

II. Toxic Properties

- A. **INHALATION:** Since sulfuric acid has a low vapor pressure, most inhalation exposures are to sulfuric acid mist. The mist is normally generated by vigorous agitation of hot diluted sulfuric acid, by electrolytic operations in which a gas is evolved, or by the combination of moist ambient air and the sulfur trioxide emitted by fuming sulfuric acid (oleum).⁽³⁾ The major effects of sulfuric acid mist inhalation in man are irritation of the mucous membranes, including those of the eyes, as well as the respiratory tract epithelium⁽⁷⁻¹³⁾ and the chemical corrosive effects on the teeth.^(13,14,15) In humans and animals, the

The Committee wishes to acknowledge the assistance of Dennis J. Paustenbach and Ralph G. Smith, Ph.D. in the preparation of this Hygienic Guide.

rate of respiration increases at concentrations above 0.35 mg/cu m.⁽¹⁰⁾ This increase decreases the retention of inhaled particles in the lung, therefore acting as a reflex protective mechanism.⁽¹⁰⁾ Exposure to 0.8-17 mg/cu m of sulfuric acid causes etch of the dental enamel and then erosion of enamel and dentine with loss of tooth substance.⁽¹¹⁻¹²⁾ Sulfuric acid mist is clearly more irritating to man than equal concentration of sulfur dioxide⁽¹³⁻¹⁴⁾ and the degree of irritancy is related to the mass median diameter of the particle.⁽¹⁵⁾ A droplet diameter of 1 micrometer seems to have greatest penetration into the lung, but the 2.5 micrometer droplet produces a greater response.⁽¹²⁻¹⁴⁾ In addition, sulfuric acid has been stated to be more irritant at conditions of high humidity.⁽¹²⁻¹⁶⁾ These responses have been noted in several species other than man, notably the monkey and guinea pig.⁽¹¹⁻¹³⁾ It appears that some persons are hypersensitive to sulfuric acid mist.⁽¹⁷⁾ Also, it has been reported that acclimatization to the subjective effects of inhalation of sulfuric acid mist may occur in persons who are occupationally exposed, to the extent that they may be able to tolerate 3-4 times the exposure levels normally tolerated by unacclimated persons.⁽¹¹⁻¹³⁾ Amdur, Pattle and others believe that asthmatics, cardiac patients, smokers and the aged may have a more pronounced detrimental response to sulfuric acid mist than the young, healthy males that participated in most of the toxicological investigations.^(5,7)

B. SKIN CONTACT: Concentrated sulfuric acid, due to its great affinity for water, will effectively remove water from many organic materials with which it comes in contact; thus it will burn and char the skin.⁽²⁰⁾ Contact with the skin causes corrosion and ulceration, the injuries being extremely painful and covered with a gray-white scab.⁽²¹⁻²³⁾

C. EYE CONTACT: Splash injuries to the eyes are the most serious hazard in the use of sulfuric acid. Contact with concentrated acid of any magnitude is capable of causing irreparable corneal damage resulting in blindness.⁽²²⁾

D. INGESTION: The ingestion of sulfuric acid is followed by vomiting of chocolate-brown material and fragments of the lining of the esophagus and stomach. This may be followed by stenoses in the esophagus and the pyloric region, adhesions in the abdominal cavity, prolonged diarrhea, pneumonia, and often death.⁽²¹⁻²³⁾

III. Industrial Hygiene Practices

Sulfuric acid is clearly one of the most important chemicals in industry, both in terms of the quantities consumed and the number of applications. The fertilizer, textile, petroleum, battery, steel, pharmaceutical, food and rubber industries are thought to be the largest consumers.⁽²⁴⁾

B. EVALUATION OF EXPOSURE:

1. *Sensory Recognition:* The threshold of detection to sulfuric acid is between 1-3 mg/cu m and at 5 mg/cu m most persons are irritated and begin to cough.⁽¹⁵⁾

2. *Air Sampling and Analysis:* NIOSH recommends that sulfuric acid be collected by drawing a known quantity of contaminated air through a cellulose membrane filter at roughly 1-2 Lpm. The sulfuric acid is then desorbed with distilled water and treated before titration with barium perchlorate. The method is sensitive to 0.1 mg sulfuric acid per cubic meter of air. At 1 mg/cu m, the accuracy is at least 10% with a relative standard deviation of 4 percent.⁽¹⁵⁾ Various midget impinger techniques are available⁽²⁴⁻²⁵⁾ but are less frequently used. NIOSH approved colorimetric instantaneous sampling tubes are available for use at a number of concentrations.

3. *Clinical Monitoring:* There seems to be a higher than normal salivary and urinary pH in those exposed to high levels of sulfuric acid.⁽¹⁵⁾ The level of plasma S-sulfonate shows a positive correlation with atmospheric sulfur dioxide at low concentrations. Unfortunately, this technique cannot be used as a reliable measure of personal exposure to sulfuric acid since S-sulfonates aren't formed.⁽²⁶⁻²⁸⁾

C. HAZARDS AND THEIR RECOMMENDED CONTROL:

1. *Inhalation:* Respirators should not be considered as substitutes for engineering control of sulfuric acid mist, but pending proper control measures or in emergencies, appropriate respirators can be used. The respirator and cartridge (canister) should be selected on the basis of the expected degree of exposure (concentration and time). A self-contained breathing apparatus (positive pressure type) with a full facepiece should be used in emergency situations. A Type

Supplied respirator may also be used in concentrations that may be immediately hazardous to life. All personnel must be trained in the limitations and proper use of the respiratory equipment as well as to be medically examined for approval to use these protective devices.

2. *Skin Contact:* Wherever contact with sulfuric acid is possible, the skin must be protected. Boots, gloves, and aprons made of rubber, Neoprene or heavy plastic film may be used.
3. *Eye Contact:* Contact of the eyes with liquid sulfuric acid must be prevented. Where this is possible, the eyes should be protected with a full facepiece (gas mask or respirator) or with a rubber frame, vapor tight, chemical worker's goggles.

IV. Medical Information

- A. **FIRST AID PROCEDURES:** In the case of ingestion, the treatment consists in prompt removal of the acid by lavage with large amounts of water.⁽²¹⁾ Alkalis, such as sodium bicarbonate, should be avoided due to the heat of formation. Give 200 mL of milk of magnesia.⁽²²⁾ With eye splashes, hold the eyelids apart and flood the eye with water for 15 minutes. Contact an ophthalmologist immediately.⁽²³⁾ When one is overcome by an unusually high exposure to sulfuric acid, remove the victim to fresh air and contact a physician.
- B. **MEDICAL MANAGEMENT:** If sulfuric acid is ingested, the victim will require 5 to 10 mg of morphine sulfate, every four hours, for relief of pain. Give demulcents, such as milk, olive oil or beaten eggs, at intervals of one or two hours.^(22,24) Do not induce vomiting. For acute inhalation episodes, use respiratory resuscitation and shock treatment as needed. Treat symptomatically and watch for signs of pulmonary edema.⁽²⁵⁾

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Prepared under the auspices of the Hygienic Guides Committee: Howard E. Runion, Chairman; Onell M. Backs, Ph.D.; Lial W. Brewer; Paul E. Caplan; William D. Christensen; Emil E. Christofano; Critz E. Cullen; Richard D. Fulwiler, Sc.D.; David Gidley; Charles E. Holdsworth, Ph.D.; Bruce S. Horvath; William C. Jones; Mars Y. Longley, Ph.D.; Frank L. Mitchell, D.O.; John D. Neefus, Ph.D.; Jeffrey Pattison; William E. Shoemaker; H.J. Trochimowicz, Sc.D.; Eugene G. Wood; Usha Wright.

AMERICAN
INDUSTRIAL
HYGIENE
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HYGIENIC GUIDE SERIES

Formaldehyde (Formalin, Methanal, Methylen Oxide) HCHO CAS Registry No. 000050000

Significant Physical Properties

Formaldehyde is a gas at normally encountered temperatures. It is also commercially available as a 30-55% aqueous solution (formalin).

Molecular weight	30.03
Odor	Pungent and irritating; intolerable at high concentrations
Color	Colorless
Autoignition temperature	430°C (806°F)
Melting point	-92°C (-133.6°F)
Boiling point	-19.5°C (-3°F)
Flash points of 37% formaldehyde solutions containing:	6% methanol: (72.2°C) 162°F (closed cup) 10% methanol: (63.8°C) 147°F (closed cup) 15% methanol: (50°C) 122°F (closed cup)
Explosive limits	7 to 73% by volume in air
Specific gravity	0.815 (20°C)
Vapor density	1.075 (air = 1)
Solubility	Very soluble in water, soluble in ether, alcohol and most organic solvents except petroleum ether.
Reactivity	Usually exothermic reactions with phenol
At 25°C and 760 mm Hg	1 ppm of gas = 0.001227 mg/L 1 mg/L of gas = 815 ppm
Polymerizes spontaneously at low temperatures. Purity determines stability.	

I. Hygienic Standards

- WORKDAY EXPOSURE CONCENTRATIONS:** Recognized U.S. Occupational Health Standards for an eight hour time weighted average exposure are 2 ppm⁽¹⁾ and 3 ppm.⁽²⁾ These values are based on human experience and are designed to protect against tissue irritation and discomfort.⁽³⁾
- SHORT-TERM EXPOSURE CONCENTRATION:** 2 ppm for a period up to 15 minutes,⁽¹⁾ and 10 ppm for a period up to

30 minutes.⁽²⁾

- CEILING CONCENTRATION:** Acceptable levels are 2 ppm,⁽¹⁾ and 5 ppm.⁽²⁾
- IMMEDIATE LETHAL CONCENTRATION:** Not established for humans. Animal studies have shown 30 minute exposures of rats to 810 ppm caused deaths in 50% of the exposed animals.⁽⁴⁾ Inhalation studies have also shown that 17 of 50 mice, 3 of 20 guinea pigs, and 3 of 5 rabbits were killed by a 10-hour exposure to formaldehyde at a concentration of 15.4 ppm.⁽⁵⁾ It has been estimated that 5-10 minute exposures to levels of 50-100 ppm might cause serious injury to lower respiratory passages in man.⁽³⁾

The Committee wishes to acknowledge the assistance of James H. Price and Norbert Schutte in the preparation of this Hygienic Guide.

II. Toxic Properties

Formaldehyde possesses a reactive group capable of forming stable bonds with tissue components.⁽¹⁾ Exposure in small concentrations causes irritation of the eyes, skin and respiratory tract. Chronic irritation of these organs may result from repeated exposure.⁽²⁾ Although generally considered as a moderately poisonous substance, formaldehyde is highly toxic by oral intake and inhalation. Exposure to high concentrations is known to cause inactivation of several enzymes and to affect the central nervous system.^(3,10) Workers exposed to 2-10 ppm (measurements taken after the incident) complained of headaches, nausea, dizziness and vomiting, prior to unconsciousness with intermittent tremors of the limbs.⁽¹¹⁾ Exposure to higher concentrations was accompanied by neuritis, neurasthenic syndrome, cerebral angiodystonia and other nervous system changes.⁽¹⁰⁾ Human carcinogenicity of formaldehyde has not been demonstrated but effects on rat fetuses have been reported.⁽¹²⁾

A. **INHALATION:** Inhalation of formaldehyde concentrations of 2-3 ppm causes discomfort as tingling sensations of the nose and posterior pharynx. Severe burning sensations of the nose, throat and trachea are noted at 10 ppm with coughing.^(13,14,15) Tolerance at these levels is possible although repeated inhalation results in chronic irritation of the mucous membranes, including nasal catarrh, pharyngitis, laryngitis, bronchitis, and asthma.^(13,14,16) Breathing of strong concentrations of formaldehyde results in chest constrictions, sensations of pressure in the head, bronchopneumonia, dysphagia, edema, or spasms of the larynx.^(13,14,17) Necrosis of the areas due to acute poisoning has not been observed due to the physical impossibility of remaining in a highly contained atmosphere.⁽¹⁴⁾ Inhalation of formaldehyde has caused symptoms similar to alcoholic intoxication⁽¹⁵⁾ and has been cited as a factor in the development of cardiovascular disease,⁽¹³⁾ as well as death.⁽¹⁸⁾ Pulmonary edema is uncommon;^(17,20) acute inflammatory edema of the larynx occurs frequently.⁽²¹⁾

B. **SKIN CONTACT:** Direct contact with formaldehyde liquid or vapor, or with solid materials containing free formaldehyde, causes the skin to appear white, hard and rough.^(11,13,14,22,23) Prolonged contact results in an eczema which may include the formation of lesions or vesicles with superficial necroses and cracking of the hardened areas.^(13,14,24) In addition, the fingernails may become soft, brown-colored, fibrous or decayed, with inflammation of the nail beds.^(14,15,20)

These effects are due to the tanning action of formaldehyde on tissue components and may spread to other body surfaces. Sensitization to formaldehyde is widely recognized,^(13,14,25) and may develop into hypersensitivity.^(13,17) Resistance and adaptation to exposure have also been observed, although acute sensitivity may occur after a prolonged or severe exposure.^(16,18) Many cases of formaldehyde contact dermatitis have been reported.^(13,14,26,27)

C. **EYE CONTACT:** Formaldehyde vapor is very irritating to the mucous membranes of the eyes. A tingling sensation results from exposure to 2-3 ppm, with mild lachrymation occurring at 4-5 ppm.^(13,15) Profuse lachrymation is generally the response to an exposure of 10 ppm or greater, although weeping rapidly subsides upon removal of the contaminated atmosphere.^(13,14) Repeated exposure may result in inflammation of the eyelids. Severe eye burns may be caused by formaldehyde solutions.⁽²⁴⁾ Airborne formaldehyde is capable of producing ocular damage.⁽²⁰⁾ One case of optical atrophy has been reported.⁽²³⁾ Formaldehyde is a metabolic degradant of methanol and is believed to be the primary cause of ocular lesions in human methanol poisoning; however, no retinal damage has been observed.^(17,28)

D. **INGESTION:** The immediate response to ingestion of formaldehyde solutions is intense pain in the mouth, throat, and stomach, followed rapidly by inflammation, ulceration and/or coagulation necrosis of the tissues and mucous membranes of the gastrointestinal tract.^(15,17,24) The symptoms also include nausea, vomiting and occasional diarrhea; shock, vertigo, stupor, convulsions, and eventually coma may ensue.^(15,17) Kidney damage or death from respiratory failure due to circulatory collapse may result.^(17,20) Fatal cases of formaldehyde poisoning have been reported.^(15,20)

III. Industrial Hygiene Practice

A. **INDUSTRIAL USES AND OCCURRENCE:** A large industrial use currently exists in the manufacture of synthetic resins; other uses are in the production of disinfectants, tanning agents, dyes, antiperspirants, nail polishes and hardeners, soaps, toothpaste, fungicides, insecticides, embalming fluids, denatured alcohol, textile finishes, synthetic gums and adhesives, paper and photographic supplies.^(11,14,29) Formaldehyde may be secondarily formed in unsuspected sources, such as automobile exhaust,⁽³⁰⁾ and cigarette smoke.⁽²³⁾

B. EVALUATION OF EXPOSURE:

1. *Sensory Recognition:* A positive identification of the presence of formaldehyde can be made by its characteristic odor, which can generally be detected by humans at concentrations below 1 ppm.⁽¹¹⁸⁾ The irritating sensory effects prevent prolonged voluntary exposure to such hazardous levels.
2. *Sampling and Analysis:*
 - a. *Direct Field Methods:* Chemical detector tubes provide a quick and relatively simple method for an on-the-spot evaluation.
 - b. *Laboratory Methods:* NIOSH recommends a spectrophotometric method.⁽¹²⁰⁾ Air samples are collected by drawing air through two midjet impingers in series, each containing 20 mL of distilled water.⁽¹²⁰⁾ The formaldehyde level is determined by color development with chromotropic acid-sulfuric acid solution to form a purple monocationic chromogen. The absorbance of the colored solution is read in a spectrophotometer at 580 nm and is proportional to the quantity of formaldehyde in the solution.^(118,12) There are several other analytical techniques, which include absorption in a sodium bisulfite solution and measured by iodometric titration,⁽¹²¹⁾ and collection in dilute potassium hydroxide solution and analyzed colorimetrically.⁽¹²²⁾

C. HAZARDS AND THEIR RECOMMENDED CONTROL:

1. *Inhalation:* Engineering controls and good work practices should be instituted to maintain the concentration of formaldehyde below the hygienic standards. In emergencies or when such controls are not feasible, respiratory protection should be used by workers knowledgeable in the proper use and limitations of these devices. Where respirators are used, the employer shall provide the appropriate respirator approved by either the U.S. Mining Enforcement and Safety Administration (MESA) or National Institute for Occupational Safety and Health (NIOSH) under provisions of 30 Part II and establish a respiratory protective program meeting the requirements of 29 CFR 1910.134. A complete respirator selection guide for protection against

formaldehyde has been prepared.⁽¹²³⁾

2. *Skin Contact:* Direct skin contact with formaldehyde solutions, or with materials containing free formaldehyde, should be prevented by process design and by protective clothing. In emergencies, liquid formaldehyde should be removed quickly from the skin by washing with large quantities of water.⁽¹²⁴⁾ Contaminated clothing and shoes should be removed during washing.⁽¹²⁴⁾ Medical attention should be sought for any irritation of the skin.
3. *Eye Contact:* Immediate irrigation of the contaminated eye(s) with large quantities of water for a minimum of
4. *Fire and Explosion:* Formaldehyde is capable of forming explosive mixtures with air between 7 and 72% by volume. The flammability of vapor from commercial solutions increases with increasing methanol content. The solutions should not be used at temperatures near their flash points under conditions where the vapor may be ignited by sparks, heated surfaces, or other sources of ignition.

IV. Medical Information

A. FIRST AID PROCEDURES:

1. *Inhalation:* Persons exposed to formaldehyde vapor should be immediately removed to an uncontaminated area. If only a limited exposure to low concentrations has occurred, generally no medical treatment will be necessary. A physician should be notified, however, if the condition appears serious. Administer oxygen and, if required, artificial respiration.^(125,126) The person should be kept warm and at rest.
2. *Skin Contact:* Affected areas should immediately be washed with large quantities of soap and water. Contaminated clothing and shoes should be removed during washing.⁽¹²⁴⁾ Medical attention should be sought for any irritation of the skin.
3. *Eye Contact:* Immediate irrigation of the contaminated eye(s) with large quantities of water for a minimum of

15 minutes is a necessity. The eyelids should be lifted occasionally to insure contact of the water with all surface tissues of the eyes and eyelids.^(14,20)

After the 15 minute flushing, 2 or 3 drops of 0.5 percent pontocaine solution (or an equally effective aqueous topical anesthetic) may be instilled in the eye(s).⁽¹²⁾ Contact a physician as soon as possible, preferably an eye specialist.

4. *Ingestion.* Place the person under a physician's care as rapidly as possible. If conscious, the person should drink large quantities of water to dilute the chemical. Vomiting should be induced, and, if vomiting does occur, more water should be given in an attempt to cleanse the stomach.^(15,24,25) Emetics (warm water) may be given if necessary;⁽¹²⁾ demulcents (boiled starch solution, milk, raw eggs) may be used to alleviate irritation.^(15,29)

B. **MEDICAL MANAGEMENT:** Although no specific treatment for exposure to formaldehyde vapor exists, administration of 100 percent oxygen has proved adequate.⁽¹²⁾ Treatment with 100 percent oxygen should not exceed one hour without interruption. Gastric lavage with water may be used to remove the formaldehyde; a stomach tube may also be used to administer a 15 percent solution of ammonium acetate in doses of 1 tablespoon, which is recommended for neutralization.^(13,19) Preplacement physical examinations should be a requirement and persons with eye abnormalities, chronic diseases of the nose, throat or lungs, and active dermatitis or a history of allergic dermatitis, should be excluded from all processes requiring exposure to formaldehyde.⁽²⁴⁾

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Howard E. Runion, Chairman; Bruce S. Horvath, Vice Chairman; Oneil M. Banks, Ph.D.; Lial W. Brewer; Paul E. Caplan; William D. Christensen; Critz E. Cullen; Richard D. Fulwiler, Sc.D.; M. David Gidley; Charles E. Holdsworth, Jr., Ph.D.; William C. Jones; Marc Y. Longley, Ph.D.; Frank L. Mitchell, D. O.; Jeffrey A. Partison; Michael L. Sanders; William E. Shoemaker; Henry J. Trochimowicz, Sc.D.; Eugene G. Wood; Usha Wright

MATERIAL SAFETY DATA SHEET

CORPORATE RESEARCH & DEVELOPMENT

SCHENECTADY, N. Y.

ISOPHORONE
REVISION A
DATE November 1977

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: ISOPHORONE

OTHER DESIGNATIONS: 3,5,5-Trimethyl-2-cyclohexene, CAS 102916,
OR Material 15365, CDS 000 101 501

MANUFACTURER: Available from many suppliers.

SECTION II. INGREDIENTS AND HAZARDS

Isophorone

ca 100

HAZARD DATA

TLV 25 ppm*
TLV 5 ppm (C)**

*Current OSHA level.

** 1977 ACGIH Ceiling concentration. (It is possible
OSHA will adopt this value.)

Rat, oral LD50
2330 mg/kg

Rabbit, skin LD50
1500 mg/kg

SECTION III. PHYSICAL DATA

Boiling point at 1 atm, deg F (C) ---	419 (215)	Specific gravity (H ₂ O=1) ---	0.92
Vapor density (Air=1) ---	4.7	Volatiles, % ---	ca 100
Vapor pressure @ 38°C, mm Hg ---	1	Melting point, deg C ---	-8.1
Solubility in water ---	Slight	Molecular weight ---	138.2

Appearance & Odor: A colorless, clear liquid with peppermint-like odor.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air	LOWER	UPPER
205°F CC	864°F	% by Volume	0.8	3.8

Extinguishing media: CO₂, dry chemical, alcohol foam or water mist for a smothering effect.

This material is a moderate fire and explosion hazard when heated.

Use self-contained breathing apparatus in fighting fires in which this material is involved.

SECTION V. REACTIVITY DATA

This liquid is stable and unreactive at room temperature; it will not polymerize. It can react with oxidizing materials such as nitric or sulfuric acid. Store away from these and other strong oxidizing materials. Oxidation products in air include oxides of carbon and nitrogen.

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SECTION VI. HEALTH HAZARD INFORMATION

TLV 25 ppm or 140 mg/m³ (See Sect. II)

Unless this material is heated (or sprayed) hazardous vapor concentrations are not readily generated because of a low vapor pressure. Vapors can be irritating and damaging above 25 ppm to the eyes and respiratory tract. Skin contact will cause defatting and irritation from prolonged contact. This material is one of the most toxic ketones. It is a kidney poison. Ingestion and excessive inhalation can be fatal. (Seriously toxic when inhaled at 40 ppm for 1 hr.)

FIRST AID:

Skin Contact: Wash area with soap and water; replace skin oils with lanolin-containing lotion.

Eye Contact: Wash with running water for 15 minutes. Get medical attention!

Ingestion: Drink 3 glasses milk or water. Get medical attention immediately!

Inhalation: Remove victim to fresh air. Get medical attention!

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel. Cordon off area; provide adequate ventilation; remove ignition sources. Absorb spill on paper or other absorbent and place in metal safety can for disposal.

Dispose of by burning in an approved incinerator or an open ditch, away from buildings or people. Use of the service of a licensed waste disposal company is also recommended.

Personnel involved in clean up should use protection against liquid contact and vapor inhalation.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide adequate exhaust ventilation in areas of handling or use.

Wear rubber gloves to prevent skin contact. Wear safety glasses and use face shields where splashing may occur. Heating or spraying operations should have efficient exhaust ventilation with 100 lfm face velocity minimum at hoods. Eye wash stations and safety showers should be available to areas of use.

A full facepiece respirator with chemical cartridge or canister or a self-contained breathing apparatus (full facepiece) must be available for emergency use.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store in a cool, well-ventilated, fireproof area away from oxidizing agents.

Prevent skin contact! Remove contaminated clothing promptly and launder before reuse. No eating or smoking in areas of use.

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APPROVED: *[Signature]*

Industrial Hygienist and
Chemical Safety Coordinator,
GE Electronics Laboratory
Syracuse, NY 13201

GENERAL ELECTRIC

MATERIAL SAFETY DATA SHEET

Approved For Release 2003/09/04 : CIA-RDP84B00890R000500020013-9

GENERAL ELECTRIC
INFORMATION

1,1,1-TRICHLOROETHANE

REVISION C

SCHENECTADY, N. Y. 12305

Phone: (513) 385-4085 DIAL COMM 8*235-4085

Date September 1978

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: 1,1,1-TRICHLOROETHANE
OTHER DESIGNATIONS: Methyl Chloroform, CCl_3CH_3 , GE Material 05879, CAS# 000 071 556
TRADENAMES & MANUFACTURER: BLACO-THANE (Baron-Blinkslee), CHLOROTHENE HD & HC (Dow), DOWCENE WR (Dow), INHIBISOL (Penetone Corp.), TRI-ETHANE (TFC Ind., Inc.), TRITHENE (SRS, Inc.)

SECTION II. INGREDIENTS AND HAZARDS

	%	HAZARD DATA
1,1,1-Trichloroethane*	>90	TLV 350 ppm**
Inhibitor	<10	Unknown
*High purity material is commercially available (DOWCENE WR). Other commercial materials (Tradenames, Sect. I) can contain up to 10% inhibitor and are designed for cold cleaning or vapor degreasing use or both (TRI-ETHANE).		Human inhalation LCLo 27 g/m ³ for 10 minutes
**NIOSH has proposed a 10-hr TWA of 200 ppm with a 350 ppm ceiling concentration (15 minutes sampling time) and recently has recommended caution in use.		TCLo 920 ppm for 70 minutes (central nervous system effects)

SECTION III. PHYSICAL DATA

Boiling point at 1 atm, deg F	-----	ca 165*	Specific gravity, 25/25C	- 1.30-1.336*
Vapor pressure at 20 C, mm Hg	-----	100	Volatiles, %	-----
Vapor density (Air=1)	-----	4.55	Evaporation rate ($\text{CCl}_4=1$)	1
Water solubility, g/100g H ₂ O	-----	0.07 g	Molecular weight	-----
				133.41

Appearance & Odor: Colorless liquid with a mild, ether-like odor which may be just perceptible (unfatigued) at about 100 ppm in air.

*Properties depend on the inhibitor and inhibitor level.

SECTION IV. FIRE AND EXPLOSION DATA

			LOWER	UPPER
Flash Point and Method	Autoignition Temp.	Flammability Limits In Air		
None	--	(High energy ignition source at 25C) 0.81 - 12.4%	8.0%	10.5%

This material is nearly nonflammable. High energy, such as electric arc, is needed for ignition, and the flame tends to go out when the ignition source is removed. Water fog, carbon dioxide, dry chemical, or foam may be used to fight fires.

Use self-contained or air-supplied breathing apparatus for protection against suffocating vapors and toxic and corrosive decomposition products.

SECTION V. REACTIVITY DATA

This material can be hydrolyzed by water to form hydrochloric acid and acetic acid. It will react with strong caustic, such as caustic soda or caustic potash to form flammable or explosive material.

It requires inhibitor content to prevent corrosion of metals; and when inhibitor is depleted, it can decompose rapidly by reaction with finely divided white metals, such as aluminum, magnesium, zinc, etc. (Do not use these metals for fabrications of storage containers for 1,1,1-trichloroethane.)

It will decompose at high temperature or under ultra-violet radiation to produce toxic and corrosive materials (phosgene and hydrogen chloride).

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SECTION VI. HEALTH HAZARD INFORMATION

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Brief exposure at 800-1000 ppm causes mild eye irritation and a little loss of coordination due to the anesthetic properties of 1,1,1-trichloroethane. Skin contact can cause defatting and, when prolonged or repeated, can produce irritation and dermatitis. It can absorb through the skin. Eye contact can result in pain and irritation. This material is considered low in toxicity among the chlorinated hydrocarbons. **FIRST AID:**

Eye contact: Flush eyes well with plenty of running water for 15 minutes.

Skin contact: Remove solvent wet clothing promptly. Wash contact area with warm water and soap. Get medical attention for irritation.

Inhalation: Remove to fresh air. If needed, apply artificial respiration. Get medical assistance immediately. (Note! Advise physician not to use adrenalin.)

Ingestion: Get medical assistance! (If a physician not immediately available and the amount swallowed was appreciable, give milk or water to drink and induce vomiting. Repeat several times. Estimated lethal dose for 150 lb man is 0.5 to 1 pint.)

PHYSICIAN: Avoid using sympathomimetic amines in treatment.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

For small spills, mop, wipe or soak up with absorbent material using rubber gloves. Evaporate outdoors or in an exhaust hood.

For large spills, inform safety personnel and evacuate area. Use protective equipment during clean-up (See Sect. VIII) Ventilate area. Contain liquid: pick up and place in closed metal containers. Do not allow to enter water supply sources.

DISPOSAL: Dispose of via a licensed waste solvent disposal company, or reclaim by filtration and distillation procedures.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide general and exhaust ventilation to meet TLV requirements. Gloves and apron (of neoprene, polyethylene or polyvinyl alcohol) should be worn when needed to avoid skin contact. Remove solvent wet clothing promptly. A safety shower should be available to use area.

Chemical goggles or a face shield should be worn if splashing is possible. An eye wash station should be readily available if splashing is probable.

In emergencies or non-routine work use self-contained or air-supplied breathing apparatus for high or unknown vapor concentrations in air. NIOSH recommends use of a full face piece respirator with an organic vapor cartridge or canister for limited time exposure below 1000 ppm. (Full face piece protection is not required below 500 ppm.)

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store in closed containers in a cool, well-ventilated area. Keep water-free. Monitor inhibitor level for vapor degreasing use. Use caution in cleaning operations involving white metal fines (see Sect. V). Trichloroethylene contamination may cause decomposition when aluminum is degreased.

Provide regular medical monitoring of those exposed to this material in the workplace. Preclude those with CNS, liver, or heart disease from exposure. Personnel using this solvent should avoid drinking alcoholic beverages shortly before, during, or soon after exposure.

Exposure of pregnant female rats to high levels of 1,1,1-trichloroethane may have caused birth defects in offspring.

DATA SOURCE(S) CODE: 1-8, 12, 19

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APPROVALS: MIS,
CRD

Industrial Hygiene
and Safety

Corporate Medical
Staff

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HYGIENIC GUIDE SERIES

Tetrachloroethylene

(Perchlorethylene)

I. Hygienic Standards

- A. **RECOMMENDED MAXIMUM ATMOSPHERIC CONCENTRATION** (8 hours): 200 parts of vapor per million parts of air, by volume (ppm).¹ This level is believed to represent a maximum, which should not be exceeded in repeated daily exposure; it is not to be used as an integrated average concentration. A level of 100 ppm would be more suitable for the latter.

1. *Basis for Recommendation:* Human experience and animal experiments.²

B. SEVERITY OF HAZARDS:

1. *Health:* Moderate. Has been widely used with relatively few instances of serious illnesses or death reported. Narcotic effects may be observed at concentrations in excess of 200 ppm. Permanent injury to the nervous system, and a fatal case with symptoms of pulmonary edema and stasis with generalized edema have been reported from a high exposure to tetrachloroethylene.³ Probable injury of the liver occurred in men operating degreasers using tetrachloroethylene.^{4, 5}

2. *Fire:* Nonflammable. Products of decomposition found in the presence of flames or hot surfaces are highly irritating to the eyes and respiratory tract and cause metal corrosion.

- C. **SHORT EXPOSURE TOLERANCE:** Human subjects developed signs of narcosis in minutes after exposure to 1000 ppm⁶ (45 min) and 600 ppm.²

- D. **ATMOSPHERIC CONCENTRATION IMMEDIATELY HAZARDOUS TO LIFE:** 6000 ppm produced unconsciousness in animals within a few minutes.²

II. Significant Properties

Tetrachloroethylene is a clear, colorless, nonflammable liquid with a distinctive, somewhat etheral odor.

Chemical formula:	$Cl_2C=CCl_2$
Molecular weight:	165.83
Specific gravity:	1.62 at 20°C/4°C
Boiling point:	121.2°C
Vapor pressure:	19 mm. (25°C)
Vapor density:	5.7 (air = 1)
Density Saturated Vapor:	1.18 (air = 1)
Solubility:	Soluble in most organic liquids. Insoluble in water.

At 25°C and 760 mm:

1 ppm	0.0068 mg/liter
1 mg/liter	148 ppm

III. Industrial Hygiene Practice

- A. **RECOGNITION:** Used widely as a dry cleaning solvent, and in degreasers, and as a component of "safety" solvents, especially where fast evaporation is not needed; also used medically as an anthelmintic. 50 ppm is detectable by odor; 1000 ppm is irritating to mucous membranes in subjects who are not regularly working with the material.

B. EVALUATION OF EXPOSURES:

1. *Instrumentation:* Davis Halide meter or other instrument⁷ for halogenated hydrocarbons; interferometer; mass spectrometry.
2. *Chemical:* Collection on silica gel:
 - (a) with subsequent hydrolysis with metallic sodium and determination of halide content.⁷
 - (b) with expulsion from silica gel by heat, followed by combustion, trapping the chloride in sodium carbonate-sodium formate solution and titration of the trapped chloride.⁸
 - (c) direct combustion followed by chloride titration as in (b) above.
 A number of other chemical methods are described.^{9, 10, 11, 12}

C. **RECOMMENDED CONTROL PROCEDURES:** Maintain air concentrations well below 200 ppm at all times in workroom atmosphere. The time weighted average concentration should probably not exceed 100 ppm. Frequently, good general ventilation will be adequate, especially if the solvent is not heated. When used in a degreaser, proper operating practices are important. Tetrachloroethylene vapor should not be permitted around open flames or very hot surfaces. Welding should be avoided in the presence of the vapor.

average concentrations of more than 100 ppm.

V. References

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IV. Specific Procedures

- A. **FIRST AID:** Remove from exposure any worker who shows dizziness, giddiness or sleepiness suggestive of early narcosis, put at bed rest and call a physician. If unconscious, artificial respiration and oxygen may be needed. The use of adrenalin should be avoided in any case of anesthesia with chlorinated solvents, because of possible ventricular fibrillation.
- B. **SPECIAL MEDICAL PROCEDURES:** As in the case of other chlorinated solvents, persons with definite liver, renal, cardiac or neurologic disease should not be placed at work where a hazard of major acute exposure exists, or where there may be substantial repeated exposures. Careful periodic medical examinations should be made of persons regularly exposed to

Because of space limitations, it is impossible to list all methods of exposure evaluation. The selections have been made on the basis of current usage, reliability, and applicability to the usual industrial type of exposure. Any specific evaluation and/or control problem will involve professional judgment. This can best be done by professional industrial hygiene personnel.

Respiratory protective devices are commercially available. Their use, however, should be confined to emergency or intermittent exposures and not relied upon as primary means of hazard control.

A relative scale is used for rating the severity of hazards: nil, low, moderate, high, and extra hazardous.

MATERIAL SAFETY DATA SHEET

Approved For Release 2003/09/04 : CIA-RDP84B00890R000500020013-9

SCHENECTADY, N. Y.

GENERAL ELECTRIC
INFORMATION

317
TOLUENE
Revision B
Date November 1977

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: TOLUENE

OTHER DESIGNATIONS: Toluol, Methylbenzene, $\text{CH}_3\text{C}_6\text{H}_5$, GE Material D3311, ASTM D362 and D341, CAS# 000 100 283

MANUFACTURER: Available from many suppliers.

SECTION II. INGREDIENTS AND HAZARDS

	%	HAZARD DATA
Toluene	100	TLV 200 ppm * TLV 100 ppm (Skin)**
<p>*Current OSHA TLV level (1968 ACGIH TLV)</p> <p>**1977 ACGIH TLV level; (Skin) notation indicates a potential contribution to overall exposure via skin absorption. OSHA has proposed adoption of the more stringent ACGIH value, 100 ppm, with ceiling concentration of 200 ppm (measured over 15 minutes).</p>		

SECTION III. PHYSICAL DATA

Boiling point, 1 atm	231 F (110.6 C)	Volatiles, %	100
Specific gravity (Water=1)	0.866	Evaporation rate (BuAc=1)	1.9
Vapor density (Air=1)	3.2	Solubility in water, %	0.05
Vapor pressure @ 25 C	28 mm Hg	Molecular weight	92.15

Appearance & odor: Water white liquid with a characteristic aromatic odor, which is perceptible (unfatigued) at about 50 ppm.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air	LOWER	UPPER
40 F (4.4 C) Closed cup	(552 C) 1026 F	% by volume	1.27	7

Extinguishing media - carbon dioxide, dry chemical, foam, and water fog.
Fire fighters should wear self-contained breathing apparatus when fighting toluene fires.
At room temperature, toluene emits vapors that may form explosive mixtures with air.

SECTION V. REACTIVITY DATA

Toluene is a stable material under normal storage and handling. It does not undergo hazardous polymerization.
Since toluene is a flammable liquid, avoid contact with heat, sparks or open flames.
Avoid contact with strong oxidizing agents. Nitric acid, especially in combinations with sulfuric acid, will form nitrocresols that can decompose violently upon further nitration.
Oxidation in air can form oxides of carbon and nitrogen.

SECTION VI. HEALTH HAZARD
 Approved For Release 2003/09/04 : CIA-RDP84B00890R000500020013-9
 (see Sect. VI) or 375 mg/m³

The olfactory detection level for toluene is 50 ppm. Vapor inhalation up to 100 ppm may produce slight drowsiness and headache. Concentrations of 100-200 ppm may cause fatigue, nausea, itching skin. Higher concentrations increase the degree of fatigue, incoordination and nausea and can irritate the respiratory tract. Olfactory detection cannot be used for safety since toluene will fatigue the senses. Skin contact will cause defatting; dermatitis may result from prolonged, repeated contact. Some absorption can occur through skin contact. Eye contact is irritating and can result in burns. Ingestion may cause irritation to digestive tract, with gastrointestinal absorption of toluene.

FIRST AID:

Inhalation: Remove victim to fresh air; get medical attention if victim is overcome.
Ingestion: Give water or milk (3 glasses) and induce vomiting. Repeat 2 times and get medical assistance.
Eye contact: Immediately irrigate with water for 15 minutes. Get medical attention.
Skin contact: Wash area with soap & water; remove & launder contaminated clothing before reuse. Replace lost skin oils with medically approved lotions or cream.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Report spills to safety coordinator, remove all ignition sources and ventilate area. Absorb spill on vermiculite or sand, scoop up with non-sparking tools and place in metal covered container. Disposal by burning should be conducted in an open pit, away from buildings and people.
 Disposal of large amounts may be via licensed solvent disposal company.
 Do not dispose of down a sewer.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Use in a well ventilated area. Exhaust hoods should have a minimum face velocity of 100 fpm. The hood design should be engineered to catch the heavy vapors that flow downward. Poorly vented areas require employees to wear chemical cartridge respirators for organic solvents. Exhaust fans should all be non-sparking and explosion proof. Safety glass or goggles should be worn in areas of use. Face shields and protective clothing are required where splashing can occur.
 Eye wash fountain should be available if splashing is possible.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Since toluene vapors are 3 times heavier than air, the vapors may flow to lower areas, where ignition sources are uncontrolled. Smoking, sparks and open flames should not be allowed in areas of toluene use. Non-sparking tools should be used in toluene work areas. Metal containers for dispensing should be grounded and electrically interconnected with the receiving container.
 Use safety cans for handling small amounts.

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APPROVED: *[Signature]*

Industrial Hygienist and
 Chemical Safety Coordinator,
 GE Electronics Laboratory
 Syracuse, NY 13201

MATERIAL SAFETY DATA SHEET

CORPORATE RESEARCH & DEVELOPMENT

SCHENECTADY, N. Y.

MATERIALS
SERVICE
INFORMATION

MERCURY

Revision A

Date January 1977

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: MERCURY

DESCRIPTION: A liquid, metallic element

OTHER DESIGNATIONS: Quick Silver, CE Material B21124, CAS 7440/10974

MANUFACTURER: Available from many sources

SECTION II. INGREDIENTS AND HAZARDS

Mercury

100

HAZARD DATA

TLV 0.1 mg/m³*
TLV 0.05 mg/m³**Human, oral LDLo
1429 mg/kgHuman, intravenous
LDLo 29 mg/kg* Present OSHA level and proposed ceiling limit
** Present ACGIH level with a proposed absolute ceiling
of 0.15 mg/m³

SECTION III. PHYSICAL DATA

Boiling point at 1 atm, deg C	356.9	Specific gravity (H ₂ O=1)	13.54
Vapor press at 20 C, mm Hg	0.0012	Melting point, deg C	-38.89
at 126C, mm Hg	1	Atomic weight	200.61
Water solubility	nil	Atomic number	80

Appearance & Odor: A silvery, dense liquid, no odor

SECTION IV. FIRE AND EXPLOSION DATA

LOWER UPPER

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air
None		

Mercury is nonflammable and nonexplosive in air.
When exposed to high temperature, mercury vaporizes to form extremely toxic fumes. When this material is involved in a fire, firefighters need to use self-contained breathing apparatus.

SECTION V. REACTIVITY DATA

Mercury is a stable metallic element. It will react slowly with oxygen when heated, and it reacts with halogens; for example, at 200-300 C a flame forms when a jet of chlorine gas is directed over mercury.
Mercury dissolves (reacts) in oxidizing acids, such as nitric; but it does not dissolve in hydrochloric acid.
Boron phosphodiiodide will ignite in mercury vapor. The following can give explosive mixtures with mercury: acetylene, ammonia, chlorine dioxide, nitric acid plus ethanol, and methyl azide.

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SECTION VI. HEALTH HAZARD INFORMATION

TLV 0.1 mg/m³

If the mercury in a small clinical thermometer were dispersed in a closed 100' x 100' x 15' room, the TLV would be exceeded. Unfavorable conditions are not indicated by color. Severe poisoning can occur with less than two hours of exposure to high concentrations of vapors. Mercury may be absorbed slowly through the skin. Repeated or prolonged contact may result in poisoning. A single ingestion of a small amount of pure metallic mercury would not be expected to cause severe injury. However, if the mercury contained organic compounds, poisoning could result.

FIRST AID: In all cases of overexposure to mercury, get medical attention!

Ingestion: Gastric lavage with 5% solution of sodium tetrathionate disulfide, followed by 2% NaHCO₃, and finally leave 250 cc of the sodium tetrathionate disulfide in the stomach.

Inhalation: Remove to fresh air.

Physician: Check blood and/or urine for mercury levels.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Clean up spills promptly. (It is convenient to use a suction bottle with a capillary tube for small amounts.) Calcium polysulfide with excess sulfur can be sprinkled into cracks or other inaccessible places to convert mercury globules into the sulfide. Collect picked-up or scrapped mercury in tightly sealed containers for reclaim or for disposal. Do not discharge mercury down the drain! Mercury can be purified for reuse, or it can be sold to a mercury salvage company when large amounts are involved.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Areas of mercury use must have adequate ventilation to meet TLV requirements. Those frequently working with mercury must use rubber gloves. (The use of rubber gloves and eye protection is recommended for all handling of mercury.) Mercury should not be heated without proper precautions to safely handle highly toxic mercury vapors!

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store mercury in small sealed containers (preferably polyethylene) in a well-ventilated area.

Mercury evaporates very slowly. Spilled mercury forms many tiny globules that will evaporate faster than a single pool and can develop a significant concentration of vapors in an unventilated area. Such vapors can be poisonous, especially if breathed over a long period of time.

Avoid contact with mercury. Follow good hygienic practices. Periodic medical examinations should be arranged for those using mercury. Good house-keeping practices and air sampling are needed where mercury is regularly used.

Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, General Electric Company extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.

APPROVED: *[Signature]*

Industrial Hygienist and
Chemical Safety Coordinator,
GE Electronics Laboratory
Syracuse, NY 13201

MATERIAL SAFETY DATA SHEET

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CORPORATE RESEARCH & DEVELOPMENT

SCHENECTADY, N. Y.

GENERAL ELECTRIC
SERVICES
INFORMATION

CHLOROFORM

Revision 3

Date November 1977

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: CHLOROFORM

OTHER DESIGNATIONS: Trichloromethane, CHCl₃, COBLEN Spalt-, Chloroform (Trade name), CAS 5000067553

MANUFACTURER: Available from many suppliers.

SECTION II. INGREDIENTS AND HAZARDS

Chloroform (CHCl₃) + stabilizer*

ca 100

HAZARD DATA

TLV 10 ppm**

*Often contains 0.5 to 1% ethyl alcohol or 0.025% amylene as stabilizer.

** ACGIH (1977) TLV on intended changes list. OSHA TLV still remains at 50 ppm ceiling limit. NIOSH has recommended a 2 ppm ceiling (revised), since chloroform has been found to generate liver cancer in mice and kidney tumors in rats. A suspected carcinogen in man. NIOSH has warned of increased toxic hazard with chloroform when alcohol has been consumed.

Human, oral LD₅₀
140 mg/kg

SECTION III. PHYSICAL DATA

Boiling point, 1 atm, deg F (C) - 142 (61)	Specific gravity, 20/20 C -----	1.49
Vapor pressure at 20 C ----- 159 mm Hg	Volatiles, % -----	ca 100
Vapor density (Air = 1) ----- 4.13	Evaporation rate (CCl ₄ = 1) -----	1.18
Solubility in water at 25 C, % - 0.8	Freezing point, deg F ⁴ (C) -----	-82 (-63.5)
	Molecular weight -----	119.38

Appearance & odor: Clear, colorless liquid with a characteristic "sweetish" ethereal odor.

SECTION IV. FIRE AND EXPLOSION DATA

LOWER UPPER

Flash Point and Method

Autoignition Temp.

Flammability Limits In Air

None

None

Non-flammable material.

When this material is involved in a fire situation, fire fighters should use self-contained breathing apparatus for protection against suffocating vapors and toxic and corrosive decomposition products.

SECTION V. REACTIVITY DATA

Chloroform is stable in a sealed container in the dark. Even when stabilized with ethanol, it develops acidity from prolonged exposure to air and light. Thermal-oxidative decomposition at high temperature can generate toxic and corrosive oxides of chlorine and carbon, hydrogen chloride, and chlorine. Avoid contact with strong alkalis.

SECTION V Approved For Release 2003/09/04 : CIA-RDP84B00890R000500020013-9 mg/m³

Inhalation of chloroform can impart narcotic effects in high concentrations (1000 ppm) and it was used extensively as a surgical anesthetic in earlier years. Prolonged inhalation of high concentrations may cause liver disorders. Eye contact with liquid or high vapor concentrations can cause pain and irritation, but serious damage is not expected. Skin contact will cause defatting and possible irritation from prolonged contact. Ingestion will cause severe burning of the mouth and throat. Liver damage and loss of consciousness may result from large ingestions (4 oz.).

FIRST AID:

Inhalation: Move patient to fresh air. Obtain medical attention for serious exposure.
Skin contact: Wash with soap and water; replace skin oils with creams or lotions.
Eye contact: Wash eyes thoroughly with plenty of water for 15 minutes. Get medical attention.
Ingestion: Give 3 glasses milk or water; induce vomiting. Repeat if large quantities ingested. Get medical attention.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel and provide adequate ventilation. Cover spill with paper or other inert absorbant; scrape up into metal container with a cover to prevent evaporation. The absorbed material may be placed on a level site outdoors, away from buildings and people, to evaporate.

Smaller spills may be evaporated in a fume hood.

Workers involved in clean-up must use protection against skin contact and self-contained breathing apparatus.

SECTION VIII. SPECIAL PROTECTION INFORMATION

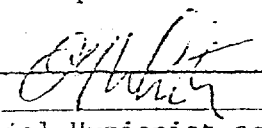
Maintain proper hood velocities of 100 lfm in areas of chloroform use. Special precautions should be made in hood design to catch the heavy vapors since chloroform is 4 times as heavy as air. Exhausts in enclosed containers (tanks) or below ground must be installed at the lowest point. When entering enclosed areas, the atmosphere should be tested before entering to ensure safe working conditions. Gloves and aprons (Buna or neoprene) should be used to prevent skin contact. Safety glasses or goggles should be worn in areas of use. Safety showers and eye wash stations should be available. Use of air-supplied or self-contained respirators only is recommended by NIOSH for concentrations above the TLV.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Use with adequate ventilation. Prevent skin and eye contact. Do not use near open flames or sparks as toxic and corrosive decomposition products may form. Do not use rubber or plastic hose or pipe for transfer.

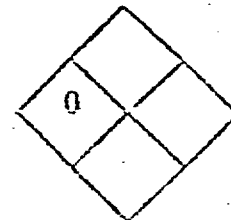
For maximum stability, store in sealed containers below 86 F (30C) away from light. Simultaneous exposure to chloroform and alcohol can increase the toxic hazards of chloroform. Use chloroform with respect and caution, since it is a suspected carcinogen in man.

Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, General Electric Company extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.

APPROVED: 

Industrial Hygienist and
 Chemical Safety Coordinator,
 GE Electronics Laboratory
 Syracuse, NY 13201

MATERIAL SAFETY DATA SHEET



PRODUCT DESIGNATION
Formula 409 All-Purpose
Cleaner

SECTION I SOURCE AND NOMENCLATURE	
Product Name Formula 409 All-Purpose Cleaner	Size
Chemical Name	Formula *CH ₂ OHCH ₂ OC ₂ H ₅
Manufacturer Clorox Company	
Address Oakland, California 94612	
For Information on Health Hazards	
For Other Information	Information Issuance Date

SECTION II HAZARDOUS INGREDIENTS						
Basic Hazardous Material(s)	Approx. or Max. %Wt. or Vol.	LD ₅₀		LC ₅₀		Toxic Level (TLV)
		Oral	Percut.	Species	Conc.	
anionic & Potassium soap surfacants	1%					
* Ethylene glycolmonobutyl ether	3.5%					
sequesterants & other cleaning ingredients	4.0%					

*major toxic effect from

SECTION III PHYSICAL DATA	
Boiling Point(C) * 135.1°C	Vapor Pressure 3.8 mmHg at 20°C
Specific Gravity (H ₂ O=1) 0.9360 at 15°/15°C	Vapor Density (Air=1) 3.10
Solubility in Water	Evaporation Rate (=1)
Melting Point	Volatile % vol. %wt.
Appearance and Odor	

SECTION IV FIRE AND EXPLOSION HAZARD DATA	
Flash Point 106°F	Flammable Limits: * Upper 15.7% UEL
Method Used	Lower 2.6% LEL
Extinguishing Media CO ₂ , dry chemical	
Special Fire Fighting Procedures	
Unusual Fire and Explosion Hazards	

SECTION V HEALTH HAZARD DATA

Toxic Level

Effects of Over Exposure

Acute

Local: slight irritant; eye irritant
Systemic: Moderately toxic; skin absorption-moderate hazard

Chronic

Local: unknown
Systemic: slight toxicity, slight irritant

Emergency and First Aid Procedures

Flush with water for at least fifteen minutes
For eyes: flush with water for 15 minutes and see a physician immediately

SECTION VI REACTIVITY DATA

Stability

Stable

Conditions to Avoid

Unstable

Hazardous Polymerization

Conditions to Avoid

Will not occur

May Occur

Incompatibility: May react with oxidizing materials

Hazardous
Decomposition Products

SECTION VII SPILL OR LEAK PROCEDURES

Steps to be taken in case material is released or spilled
May be diluted with water and flushed into sewer

Waste Disposal Method

SECTION VIII SPECIAL PROTECTION INFORMATION

VENTILATION

Local Exhaust: Good general ventilation adequate

Mechanical

Protective Gloves not normally required

Eye Protection not normally required

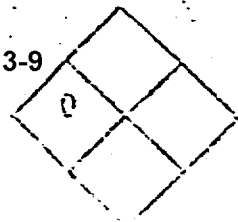
Respiratory Protection not normally required

Other

SECTION IX SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage
none

Other Precautions



PRODUCT DESIGNATION
Folvia 400 All Purpose
Disinfectant

SECTION I - SOURCE AND NAME OF MATERIAL

Product Name Folvia 400 All Purpose Disinfectant

Chemical Name Sodium Hypochlorite

Manufacturer Clorox Company

Address Oakland, California 94612

For Information on Health Hazards

For Other Information Information Issuance Date

SECTION II - HAZARDOUS INGREDIENTS						
Basic Hazardous Material(s)	Approx. or Max. %Wt. or Vol.	LD ₅₀		LC ₅₀		Toxic Level (TLV)
		Oral	Percut.	Species	Conc.	
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Ethylene glycolmonobutyl ether	5.5%					
sequesterants & other cleaning ingredients	4.0%					
*major toxic effect from						

SECTION III - PHYSICAL DATA			
Boiling Point (C) * 135.1°C	Vapor Pressure 3.8 mmHg at 20°C		
Specific Gravity (H ₂ O=1) 0.9360 at 15°/15°C	Vapor Density (Air=1) 3.10		
Solubility in Water	Evaporation Rate (=1)		
Melting Point	Volatile	% vol.	% wgt.
Appearance and Odor			

SECTION IV FIRE AND EXPLOSION HAZARD DATA			
Flash Point 106°F		Flammable Limits:	Upper 15.7% UEL
Method Used			Lower 2.6% LEL
Extinguishing Media CO2, dry chemical			
Special Fire Fighting Procedures			
Unusual Fire and Explosion Hazards can react with oxidizing materials			
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Toxic Level

Effects of Over Exposure

Acute

Local: slight irritant; eye irritant
Systemic: Moderately toxic by absorption-moderate hazard

Chronic

Local: unknown
Systemic: slight irritant; moderate hazard

Emergency and First Aid Procedures

Flush with water for at least 15 minutes.
For eyes: flush with water for at least 15 minutes. See a physician immediately.

SECTION VI REACTIVITY DATA

Stability

Stable

Conditions to Avoid

Unstable

Hazardous Polymerization

Conditions to Avoid

Will not occur

May Occur

Incompatibility: May react with oxidizing materials

Hazardous
Decomposition Products

SECTION VII SPILL OR LEAK PROCEDURES

Steps to be taken in case material is released or spilled: May be diluted with water and flushed into sewer

Waste Disposal Method

SECTION VIII SPECIAL PROTECTION INFORMATION

VENTILATION

Local Exhaust: Good general ventilation adequate

Mechanical

Protective Gloves

not normally required

Eye Protection

not normally required

Respiratory Protection

not normally required

Other

SECTION IX SPECIAL PRECAUTIONS

Precautions to be taken
in handling and storage

none

Other Precautions

NAME

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RECOMMENDED METHOD OF USE

ESSENTIAL LABELLING

CAUTION.

ECOLOGICAL DATA

REMARKS

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